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Our Native CACTI

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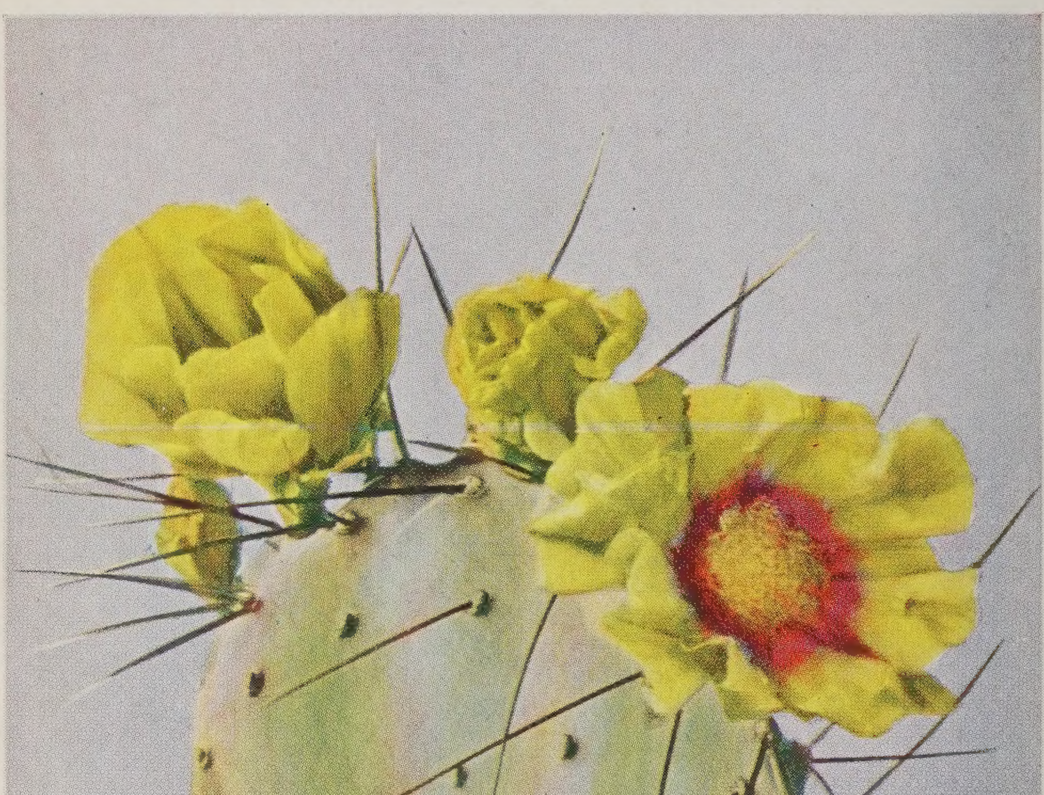

Opuntia macrocentra

Bot
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Our
Native Cacti

By

Ethel Bailey Higgins

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FOREWORD

John C. Van Dyke has probably said the last word on the desert—of light, color and air, which in the final analysis are indescribable. Of the desert flora he has this to say:

"Are they beautiful, these plants and shrubs of the desert? Now just what do you mean by that word beautiful? Do you mean something of regular form, something smooth and pretty? Are you dragging into Nature some remembrance of classic art, and are you looking for the Dionysius face, the Doryphorus form, among these trees and bushes? If so, the desert will not furnish you too much of beauty. But if you mean something that has a distinct character, something appropriate to its setting, something admirably fitted to a desired end (as in art the peasants of Millet or the burghers of Rembrandt or Rodin), then the desert will show forth much that people nowadays are beginning to think beautiful. Mind you, perfect form and perfect color are not to be despised; neither shall you despise perfect fitness and perfect character. The desert plants, every one of them, have very positive characters; and I am not certain but that many of them are interesting even in form and color.

"No doubt it is an acquired taste alone that leads one to admire greasewood and Cactus . . ."*

But if it is an acquired taste alone that takes cognizance of the beauty of the Cactus, it is one that needs little cultivation, and one that justifies itself by the under-

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**The Desert*; John C. Van Dyke.

lying qualities, the standards which Mr. Van Dyke sets up—perfect fitness, beauty of color in flower and spine, and of form as well. If there is not always grace, there is here again that perfect harmony with, and adaptation to, conditions and surroundings which mean perfect fitness and character.

First must come admiration for its adaptability to conditions encountered—of drought and burning heat; its stored food and drink in the form of succulent branches holding moisture, in some cases to the extent that they are known as the "wells of the desert;" its formation to insure a minimum of evaporation; its leathery skin; its envelopment, in many cases, by interlaced spines to keep from it the hot glare of the desert sun.

Some of the very qualities by means of which the Cactus protects itself from these adverse conditions become an added menace to its existence, a temptation to man and beast alike to steal its precious moisture. From these foes it is armored by formidable thorns and spines. If we can forget their ferocity, these are often found to be very beautiful in color and shape as well as in their arrangement. Some of them look as if carved from ivory or shell. The coloring of the spines varies greatly—silvery green, ash-gray, brown, purple, rose, ruby, yellow and cream—and they are almost always attractive. Even the Opuntia bigelovi, the hated silver Cholla, has beautiful, silvery-green spines when young.

But the glory of the Cacti is in their flowers: their silky texture and ephemeral beauty and their wondrous coloring which would seem almost beyond comparison. Their coming makes of the desert a veritable Garden of the Gods, and they bring to the observer a joy and wonder that is akin to awe.

William Watson, for many years assistant curator of the Royal Botanical Gardens, Kew, England, has this to say in his *Cactus Culture for Amateurs*: "The flowers of the majority of the species of Cactuses are unsurpassed, as regards form and size, and brilliancy and variety of color, by any other family of plants, not even excluding orchids."

However, to many "beauty is as beauty does," and is found only in practical usefulness. But here the various members of the family have much to say for themselves.

The padres, when first journeying to California, rejoiced that the Cactus had never failed them, its fruit being known to them as an article of food. W. H. Emory, who commanded a military reconnoissance from Fort Leavenworth in Missouri to San Diego in California, in his notes of October 4, 1846, speaks of the fruit, "yerba de la vivera." It furnishes food other than fruit; it is drink to the desert traveler that may mean the difference between life and death; it becomes a refuge for some of the smaller animals of the desert, and a nesting place for the birds where they are protected from marauders; it is valuable in lean times as a forage; as we shall see, it is able to give a very good account of itself both for its beauty and its usefulness.

ETHEL BAILEY HIGGINS

San Diego, Cal.

May, 1931

CHAPTER I

The Cactus Family

Cactus, from the Greek *Kaktos*, a prickly plant, was the name given by early botanists to a group of plants of which only a few species were known; and the word is still, in popular usage, the one which indicates any one of the many hundreds, even thousands, of species which exploration and scientific research have made known.

The family *Cactaceae* is almost without exception confined to the western hemisphere; and yet, while we are very greatly indebted to the botanists attached to the early border surveys and other expeditions into the western United States and Mexico (to no other single person more than to Dr. George Engelmann, in all probability), it must be said that our greatest debt for knowledge of this most interesting family is to European botanists, collectors and fanciers.

There has existed in Europe, for a long period, a lasting and consistent interest in and effort toward their collection and culture; while that in the United States has been until quite recent years, more or less spasmodic and intermittent.

The mass of literature on the subject has been and is still in great part confined to other languages than English. Some most valuable contributions to the subject have been given in the reports attached to government and railroad surveys; in various government documents and leaflets; in issues of scientific journals. But these are all unavailable to the general reader, being for the most part out of print. (A few exceptions will be referred to later.)

One of the most interesting of these reports is that of Dr. Engelmann, *Cactaceae of the Boundary* (1859); later reprinted in Engelmann's collected works (1887). The beautiful illustrations in this work, the most exquisite steel engravings, with such perfection of detail and accuracy, are indeed a delight. These too, however, are out of print, and only available in those libraries which contain special collections of this character.

In 1919–1923 there was published, under the auspices of the Carnegie Institution, *The Cactaceae* a monograph in four volumes, by Dr. N. L. Britton of the New York Botanical Garden and Dr. J. N. Rose of the Smithsonian Institution. That interest in the subject was not lacking, and that the work was a needed and appreciated one, is evidenced by the fact that the first two volumes are already out of print and cannot be obtained.

Many changes in classification were made by these authorities, many new genera established and new species added. Some of these changes have been the subject of controversy, not all agreeing with their ruling; and so with the disagreements of botanists has arisen a cumbersome synonymy. This, coupled with the fact that as the wave of enthusiasm for the culture of Cacti has arisen, florists are in many instances naming them rather indiscriminately, has led to the use of a nomenclature that is confusing and, in many instances, incorrect and misleading.

Where authorities disagree it is necessary to have some standard, and inasmuch as Britton and Rose in their *Cactaceae* are the only available authorities in the English language, their classification will be followed. In this book, the object of which is to afford pleasure and interest to the observer who finds gratification in knowing something of the flowers and plants he encounters, without caring for special study on the subject, an endeavor will be made to be exact in the use of names, Britton and Rose being in all cases taken as the standard. In case other names are in general use, synonyms will be given, also the common and local names so far as known. The spelling is according to *Standardized Plant Names.*

The general distribution of the Cactaceae is through the warm and arid regions of the American continents, both North and South America. In Mexico they abound in great variety; many species are also to be found in the Southwestern United States.* From here they extend up the Western States and on the Pacific Coast as far north as British Columbia. In the East some species are abundant in Florida, some few extending through the Atlantic Coast States into Nova Scotia. And they are scattered more or less through the Central States, especially in the South.

In general, those most in cultivation (with the exception of some of the old-time favorites, such as the well-known Night Blooming Cereus and the Christmas or Crab Cactus, so widely cultivated for many years), are from the Southwestern United States, and East and

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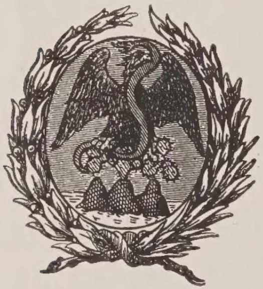
*At the back of this book are given lists, as complete as possible, of the Cacti found throughout the U. S.

West alike are most familiar with them or most likely to come in contact with them. So it is these which we will meet and with which we will become acquainted in the pages following. Among them are plants ranging from half an inch in diameter and height to the lofty, towering columns of the Giant Cactus of Arizona; from the slender and almost vinelike specimens to the Barrel Cactus, the Well of the Desert—all of infinite, varying interest.

To the average person, the word Cactus brings vaguely to mind the so-called Prickly Pear; and that this is the first thought is perhaps only natural and to be expected, for it is the most widely distributed and the most characteristic Cactus growth in the United States. It is so widely known, extending as it does over the whole Atlantic seaboard from Florida to Nova Scotia, through the Middle Western States, and again on the Pacific Coast from the boundary (and, of course, below) to British Columbia, that it might well make a bid for the honor of posing as the national flower, were it not that Mexico, where the Cactus is much more abundant and widespread, has already preempted it, using it in her coat of arms.


Mexican
Coat of Arms

A close second in the popular thought is perhaps the so-called Cholla of the Southwest. These form the two great divisions of the genus Opuntia, the Platyopuntia or flat-stemmed, and the Cylindropuntia or cylindrical-stemmed. A third, which is intermediate between the cylindrical and flat forms, the Tephrocactus, is a South American form and does not find a place in our list of "native sons."

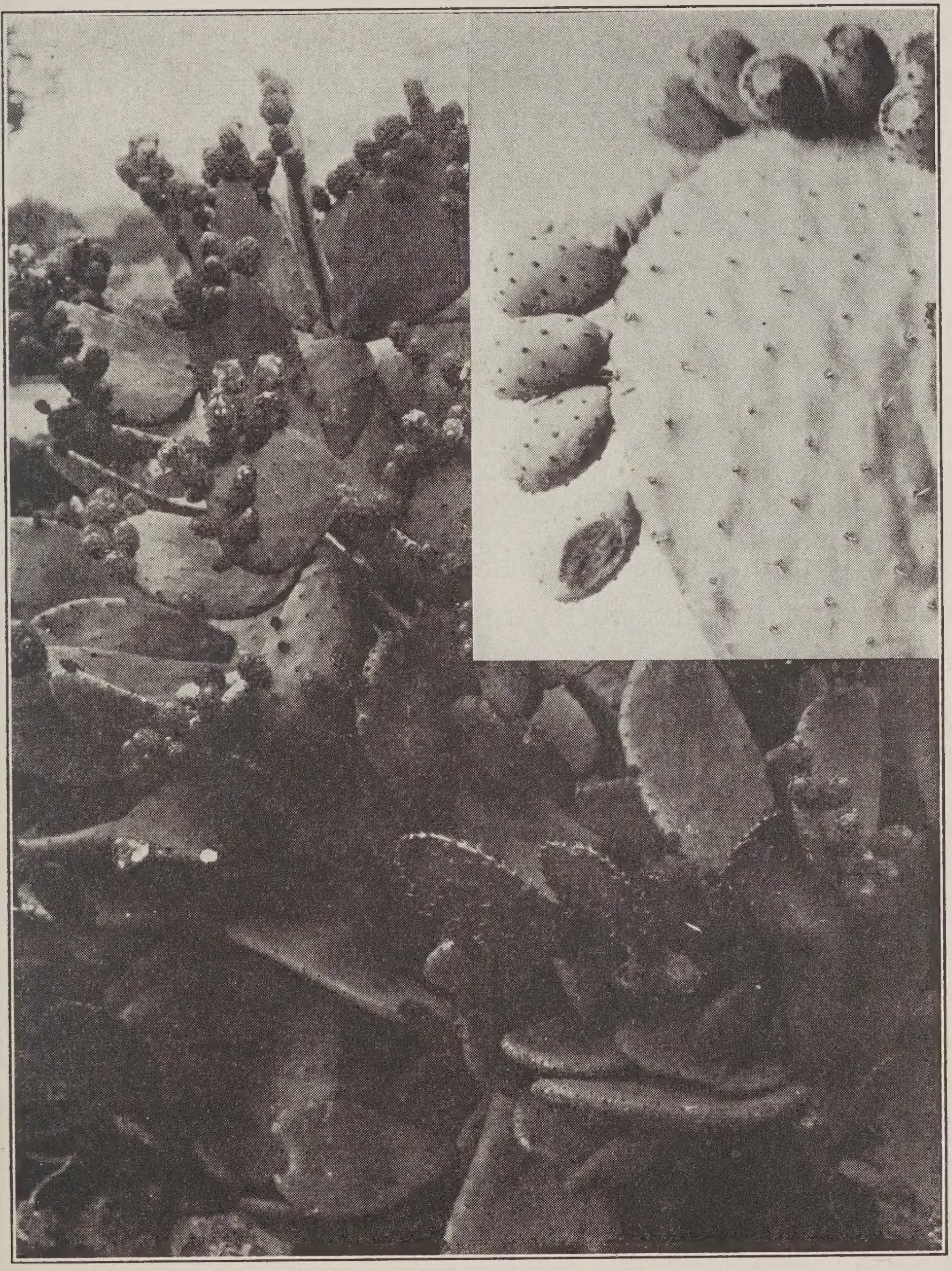
CHAPTER II

The Opuntia and Its Uses

The Opuntia traces its name to a town in Greece, in which Pliny (A.D. 23–79) records the existence of a Cactus-like plant, the "herba opuntia." What this plant was, is uncertain, as the Cactus is indigenous to no locality in the Old World, though now thoroughly naturalized and highly prized for its economic value in the Mediterranean countries.

The Opuntia is distinguished by its jointed stem. The leaves, except in rare cases, are minute and soon fall, so that we generally see none except on the new shoots or joints, the flat joints of the Platyopuntia being therefore stems and not leaves as they are sometimes wrongly called. They vary in size, in shape, in color, and in the character and distribution of the areolae or centers whence spring the leaves, spines, glochids or spicules and flowers; also in the character of the spines, their color and arrangement. All these characteristics are factors to be noted in determining the species.

The economic value of these plants has long been recognized. The cultivation of the Indian Fig (O. ficus-indica) and of the Tuna (O. megacantha and O. streptacantha, known as the Tuna Cardona) for use as a food dates back to prehistoric times, their origin being unknown.



OPUNTIA FICUS-INDICA (Indian Fig)
Illustration in upper righthand corner shows fruit at closer range

These species are widely cultivated in the Mediterranean countries, where use is made of them both for their growth in hedges and for their fruit, which is dried and widely marketed. In Sicily they are regarded as one of the chief crops, the people subsisting upon them largely for six months of the year. They are said to produce nine tons to the acre, growing practically without care, on a poor and rocky soil where nothing else will grow. The fruit is considered to be highly nutritious, containing about 14 per cent of sugar and 2 per cent of fat. Thus, a crop of nine tons would mean a sugar content of 2500 pounds. The authority for this statement adds that while it is not listed as a horticultural fruit, it should be because of its superiority in food value. As a matter of fact, it is so classed in Mexico, where it is widely cultivated; the fruits of the wild forms (Cardonas), and also of the cultivated forms (Mansas), with recognized species or named varieties, are marketed in abundance.

The United States Government, through the Department of Agriculture, has made a careful survey of this industry in Mexico both as regards the culture of the plants and their use as a food product; and although their food value was not found to be as high as indicated by the authority above quoted, they were yet given a high place in dietetic value.* These fruits are not only offered on the market as gathered, for immediate consumption, but are made into fruit honey, fruit butter, and a paste of the fruit dried, "queso de tuna" or tuna cheese. Dr. Griffiths gives in detail the methods of preparation, the various cultivated varieties, and the customs attendant on their harvesting and marketing.

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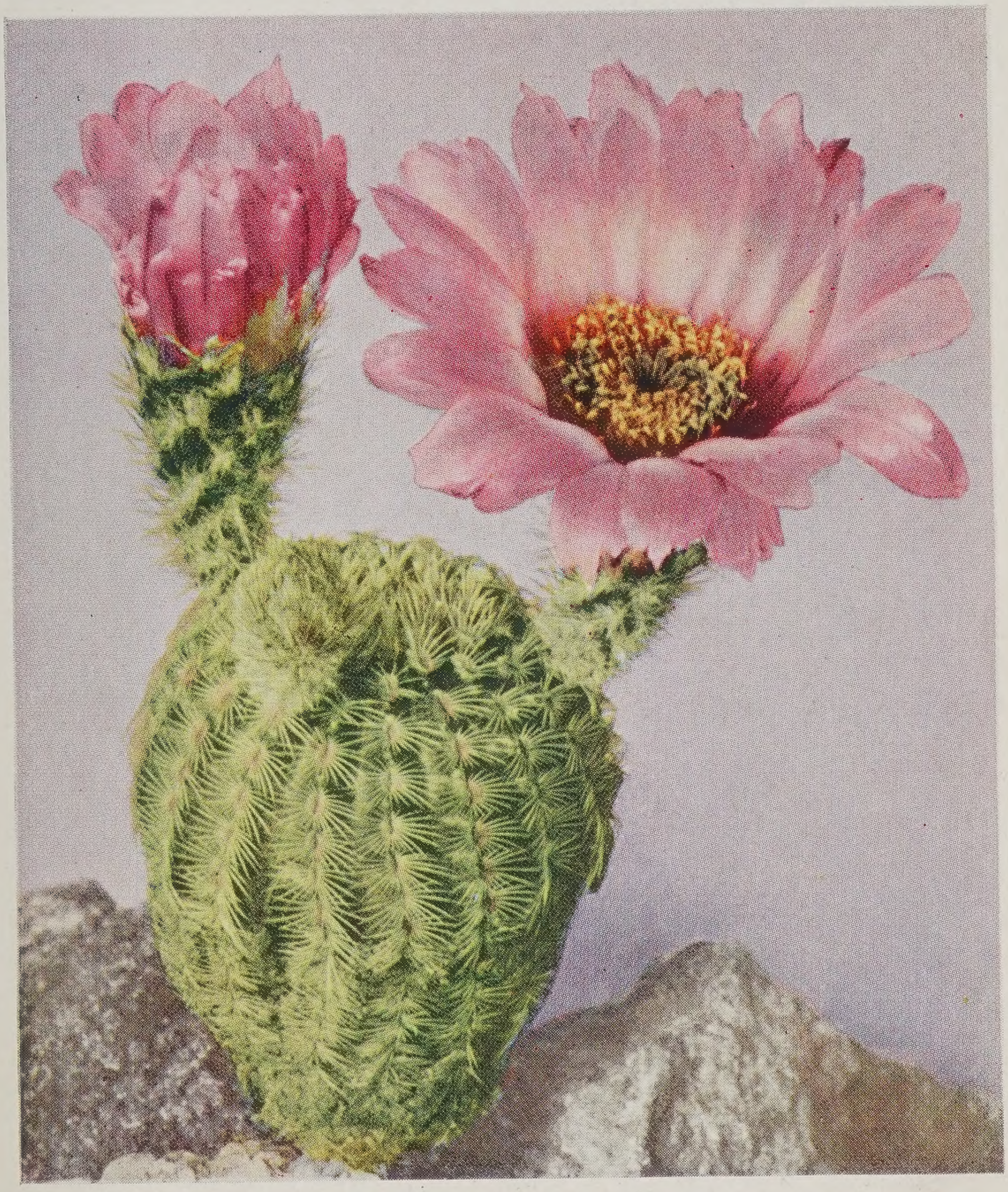
*Bureau of Plant Industry,—Bulletin 116, "The Tuna as Food for Man" by David Griffiths and R. F. Hare, Dec. 2, 1907.



Echinocereus reichenbachi

They were introduced into California by the padres, coming from Mexico, who planted them about the missions, serving the double purpose of a source of food and a means of defense, by reason of the quickly grown, impenetrable hedges which they formed; and thus became the Mission Cactus. They may still be seen growing about the old missions in masses.

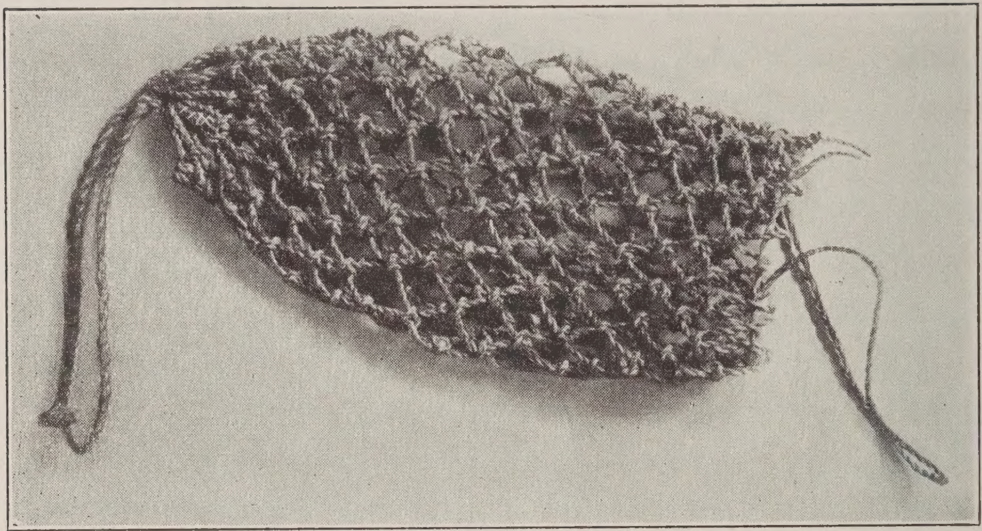
The fruit is quite commonly seen in the markets of the Southwest, and is used as a salad fruit, as a pleasant drink, and to eat out of hand as any other fruit.

There are two objections to be urged against the fruit, which must prevent its true worth being appreciated by the American consumer; viz. the great abundance of seed and the annoyance of the small glochids or barbed spicules. These are most annoying to the novice, but various devices are used to rid the fruit of them before marketing. The fruit is lightly brushed or rolled together in water; in eating it is slit with a knife and the rind rolled back.

These fruits were the subject of experimentation by Luther Burbank, the "wizard" in plant culture, by whom were produced, it is said, fruits of about three inches in diameter and of a delicious flavor, but the objections above noted still held.

Mrs. Melicent Humason Lee, Director of the Indian Arts League, San Diego, Calif., once gave me an interesting account of how the Tuna fruits are handled in harvesting by the California Indians.

The fruits are removed from the plant by means of a snare of bent twig, after having been subjected to a preliminary brushing to free them from the annoying



CACTUS BAG MADE FROM MAGUEY FIBER
Used by the Indians in San Diego County, Cal. From a loan exhibit to San Diego Museum (Mrs. Abbie Boutelle Collection)

spicules, the brush being of weeds tied in the form of a small whisk broom. As freed from the plant by the ensnaring loop, they are dropped into a hammocklike bag, woven of the fiber of the Maguey (Agave deserti); they are then shaken to further remove, by friction, the objectional short barbed spines.

Mrs. Lee adds some interesting information concerning the further uses of the Prickly Pear by the Indians: the use of the juice of the joints, mucilaginous in quality, which added to impure or muddy water, serves to precipitate the impurities; its use as a medium in mixing the whitewash for the missions; the use of the spines for tattooing.

The fruit, however, is not the only food product of the Prickly Pear. The flower buds and flat lobes of the stem are utilized as well. The young joints, before the development of the spines, are cut into strips, boiled, and with the addition of butter, pepper and salt, are served like string beans, and prove to be surprisingly palatable. The flavor is somewhat like that of the artichoke, but they are mucilaginous, resembling the okra. They are used by the Indians and by the Spanish-speaking people of Southern California.

Up to date, in this manaña land, a Los Angeles firm has put them on the market in the form of a canned product, prepared as above, under the name of 'Nopalitos tiernos.' After cooking as above they are sometimes fried; the entire lobe of the joint, is also fried whole like a slice of egg plant.

The lobes of the Prickly Pear, used in the form of a poultice, are said to be efficacious as a remedy for rheumatic inflammation. The story is vouched for by a mining man of the almost miraculous abatement of inflammation from rheumatism, in the case of a man, brought on a stretcher into Ensenada, Baja California, unable to walk, who in two days was cured as a result of the ministrations of an Indian woman who used the Cactus lobes as above.

Both the Prickly Pear and the Cholla are used for forage with more or less success. Various species of the Prickly Pear were used by Burbank in his experiments looking to the development of a spineless Cactus for use as a forage. It has not, however, proved the success which was anticipated; the spineless forms proved to be less resistant to drought conditions than many of the others; also it was found too bulky a form of feed except for use in time of stress or in conjunction with other foods; and for the same reason did not admit of economical

SHOWING GROWTH OF THE PRICKLY PEAR

transportation, so that its value was limited by the fact that it had to be used where it was raised.

The United States Department of Agriculture has experimented with great care, with the growth and use of the Prickly Pear as a forage, its conclusions being adverse except under special conditions. These conclusions are set forth in a pamphlet, *Prickly Pear as a Stock Feed*,* and are somewhat discouraging to the culture of the Cactus as a forage. Nevertheless, in those sections where the Prickly Pear and the Cholla grow in abundance, they have at times proved of great value. In many places the stock, in lean seasons, eat the prickly things gratefully. It is in some sections regularly fed in connection with other food. In *New Trails in Mexico*† a statement is made that in localities where stock have available water, and have as food the Opuntia, they habitually, and from preference, take the succulent stocks of the Cactus and refrain from drinking the water.

In feeding, it is usual for the spines to be first burned off with a torch, as otherwise death is sometimes produced through perforation of the bowels by the spines. Sometimes, on the range, death comes in a worse and more maddening form; the muzzles of the feeding animal will become entangled with the joints of the Opuntia, and all its efforts to free itself from the tormenting, clinging spines being vain, its death comes from starvation.

A strange example of what changed environment and varying conditions may bring to a plant is shown by the attempt, all too successful, to establish the Opuntia as a stock feed in Australia. Grateful as it is to the hungry cattle on the range in many sections of the arid Southwest

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*U. S. Dept. of Agriculture, Farmer's Bulletin No. 1072, by David Griffiths. Issued March 1920. Revised December 1928.

†"New Trails in Mexico," Carl Lumholtz.

United States, it has in its adopted home become a pest, so widespread and rapacious in its growth, that millions of acres are being overrun, and all efforts at its control or eradication are proving futile. Its natural foes in its native habitat, not serving as a check in its new home, it soon far overstepped bounds. Governmental and scientific aids have been called in, so far ineffectually.

One form of pest which attacks some of the Prickly Pears, and which has rendered them and an allied form (the Nopalea, whose joints resemble those of the Platyopuntia in form, but whose flower is so different that it is considered to be quite distinct botanically), in times past, a most profitable source of income, is the cochineal, an insect feeding upon these plants and collected for the manufacture of a dye. The Tuna was used for this purpose, but more especially the Nopalea (N. cochenillifera). Plantations for this purpose, called nopalaries, were maintained, often of great extent and highly profitable. With the advent of the cheaper coal tar dyes, they became unprofitable, and so cultivation of the cochineal insect for this purpose has been largely done away with.

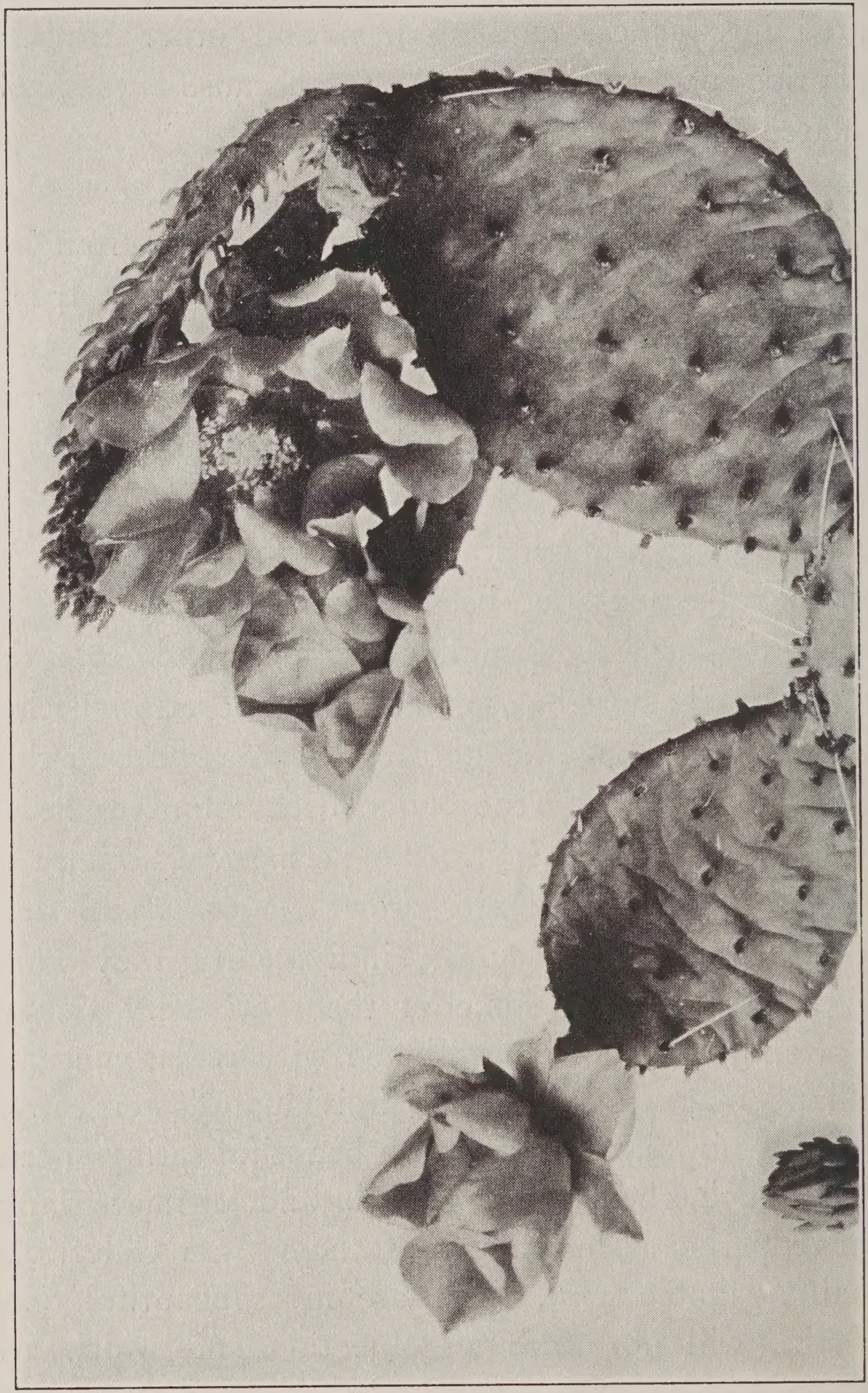
The Cylindropuntia, the *Cholla* of the Southwest, other than in its use as a forage, has not the economic value that the Prickly Pear boasts. Its fruits are not edible, although its minute seeds, ground finely, are used as a flavor to the meals made from various seed, and notably from the acorn, by the Indians; they also dry the flower buds and use them

Stem of Cylindropuntia; pulp rotted away showing recticulation.

as a food. Its woody joints, freed from pulp, and manufactured into canes, napkin rings and other trinkets, form curios and souvenirs, interesting because of the finely reticulated fiber.

Both forms of the Opuntia vary in size from the very small to treelike growths, and in shape from low and sprawling habit to trees with large woody trunk. The distribution is very wide, more extensive than that of any other genus of Cacti; hence, widely spread as they are, their beauty may be enjoyed in every part of the country.

The Opuntia, though known and appreciated for its economic value, has not been a favorite with fanciers, nor with the owner of small collections, and from the standpoint of beauty has not had the appreciation that it really merits. For although the blossoms of the Prickly Pear, whose homely virtues have been found to be so varied and so numerous, do not, perhaps, especially in some of the species of larger growth, show up to such good advantage in the mass, individually they must claim our admiration; some of them are very showy, more often yellow or yellow tinged with red, sometimes a brilliant magenta pink, the individual flowers often 3 to 4 inches in diameter and of a beautiful satiny sheen. And, although their rapid growth and ultimate large size have perhaps shut many of them from collections of small available area, there are most beautiful ones whose size will not form an objection and which are worthy in beauty of a place beside many a more rare specimen.



OPUNTIA OPUNTIA (Syn. O. vulgaris)

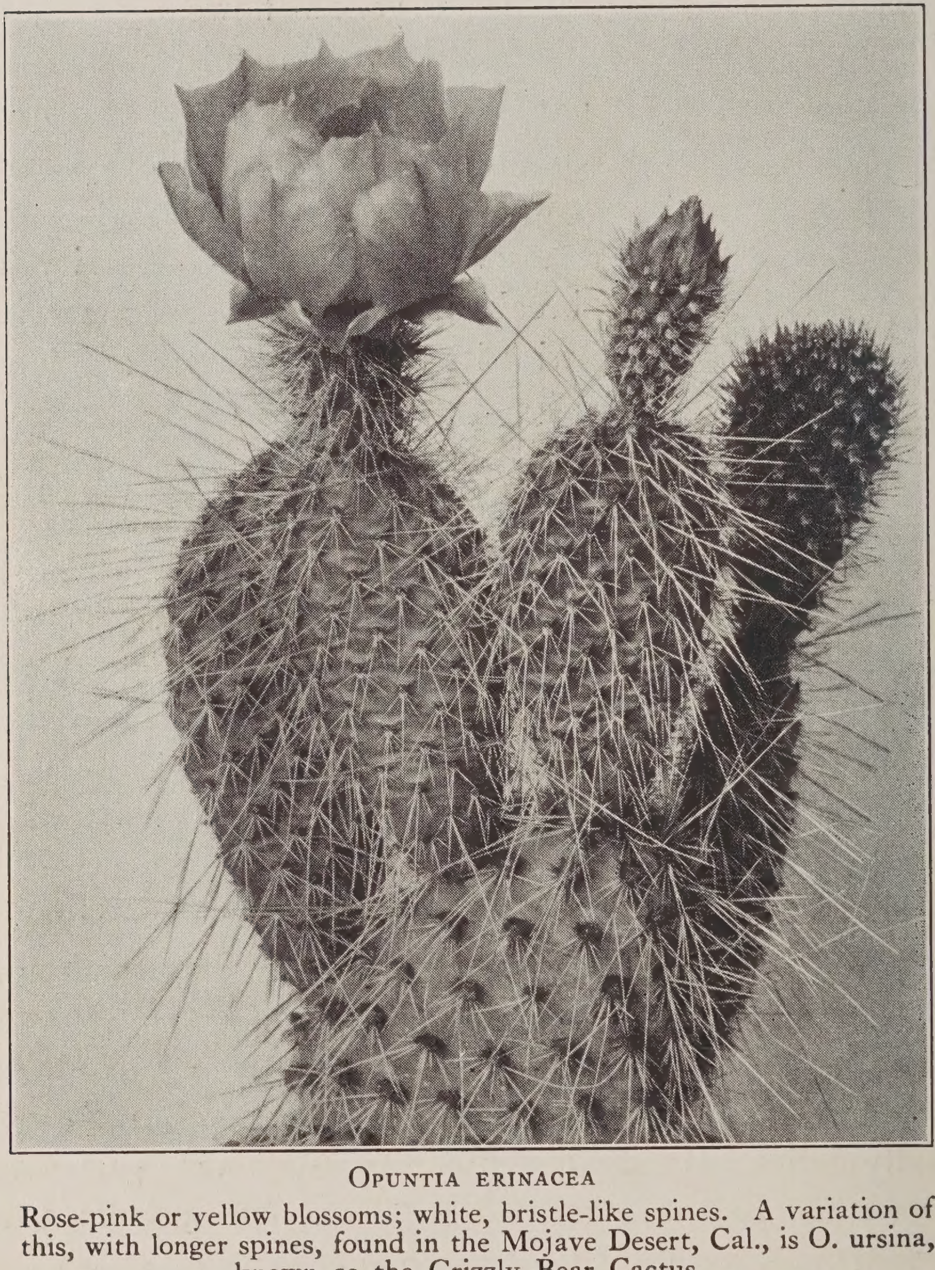
Flowers clear yellow; joints yellow-green and wrinkled in appearance

One of the earliest known, the Opuntia opuntia, is a native of the Atlantic States. It is a low growing plant with the most beautiful clear yellow flowers, in shape and appearance very like a single rose, and its beautiful pointed buds carry out this similarity. It has been known and appreciated for many years, and in earlier periods of cultivation was used most effectively. Dr. Soleman Conrad (Professor of Botany, University of Pennsylvania, 1829) breaks forth in verse concerning this beautiful Opuntia with its roselike blossom and long, slender bud, as follows:

"Do I not see the garden walls of stone
Rude, low, yet with prickly Cactus crowned
So picturesque and rural."

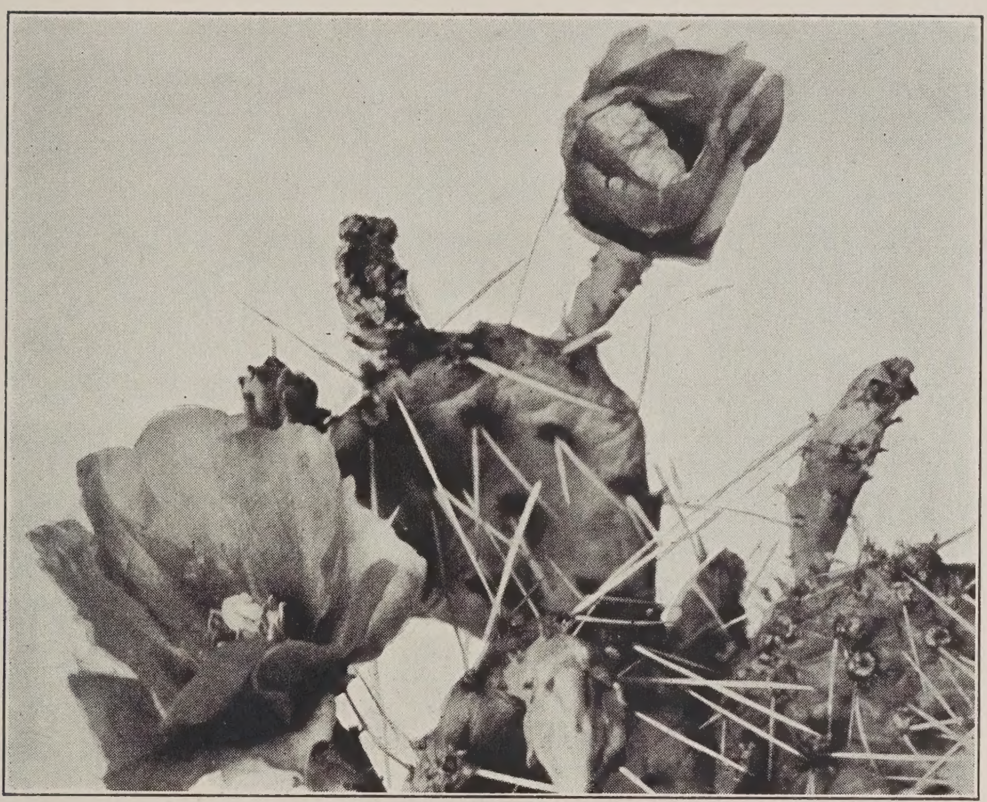
Another, with a blossom "mighty lak a rose," is the little, rather insignificant plant (when not in bloom), the Opuntia pottsi, which is found in New Mexico and Texas, and has a lovely roselike flower; it blossoms so profusely that the little plant is smothered in bloom of a most delicate clear pink.

Another of the Opuntias, small in size (O. erinacea) is most interesting, not only for its flowers which are not as open as some of the others, but more cup shaped, the color varying on plants that seemingly have no perceptible difference, from a beautiful rose-pink to an equally delightful and clear toned yellow. This is classed as identical with the O. ursina or Grizzly Bear Cactus by Britton and Rose, although they had before been listed separately as O. erinacea and O. ursina. They are interesting plants in themselves, aside from their blossoms, because of their spines, bristlelike in character,



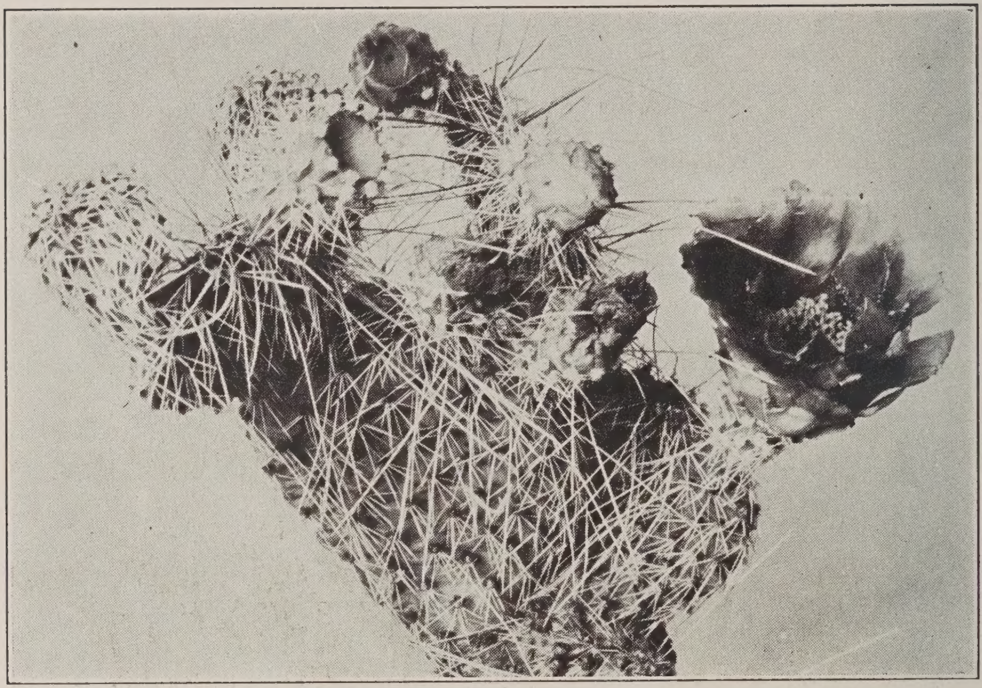
OPUNTIA ERINACEA

Rose-pink or yellow blossoms; white, bristle-like spines. A variation of this, with longer spines, found in the Mojave Desert, Cal., is O. ursina, known as the Grizzly Bear Cactus



Opuntia pottsi (Syn. O. filipendula)
This is a New Mexico gem, and until it blossoms it is very inconspicuous, but when in bloom it fairly flaunts its beautiful pink, rose-like blooms

and long and white. They are found in the Mojave desert in California, and in Eastern California extending into Utah, Nevada and northern Arizona. The form known as the Grizzly Bear Cactus is from the Mojave, and the only apparent difference seems to be in the longer spines. It is described by Alverson, and thus quoted by Britton and Rose: "This curious plant is covered with hairs or flexuous spines, some of which are from 3 to 6 inches long, and I have some extra fine ones on which the spines are 9 to 12 inches long." I have never myself seen them with spines of this length. The



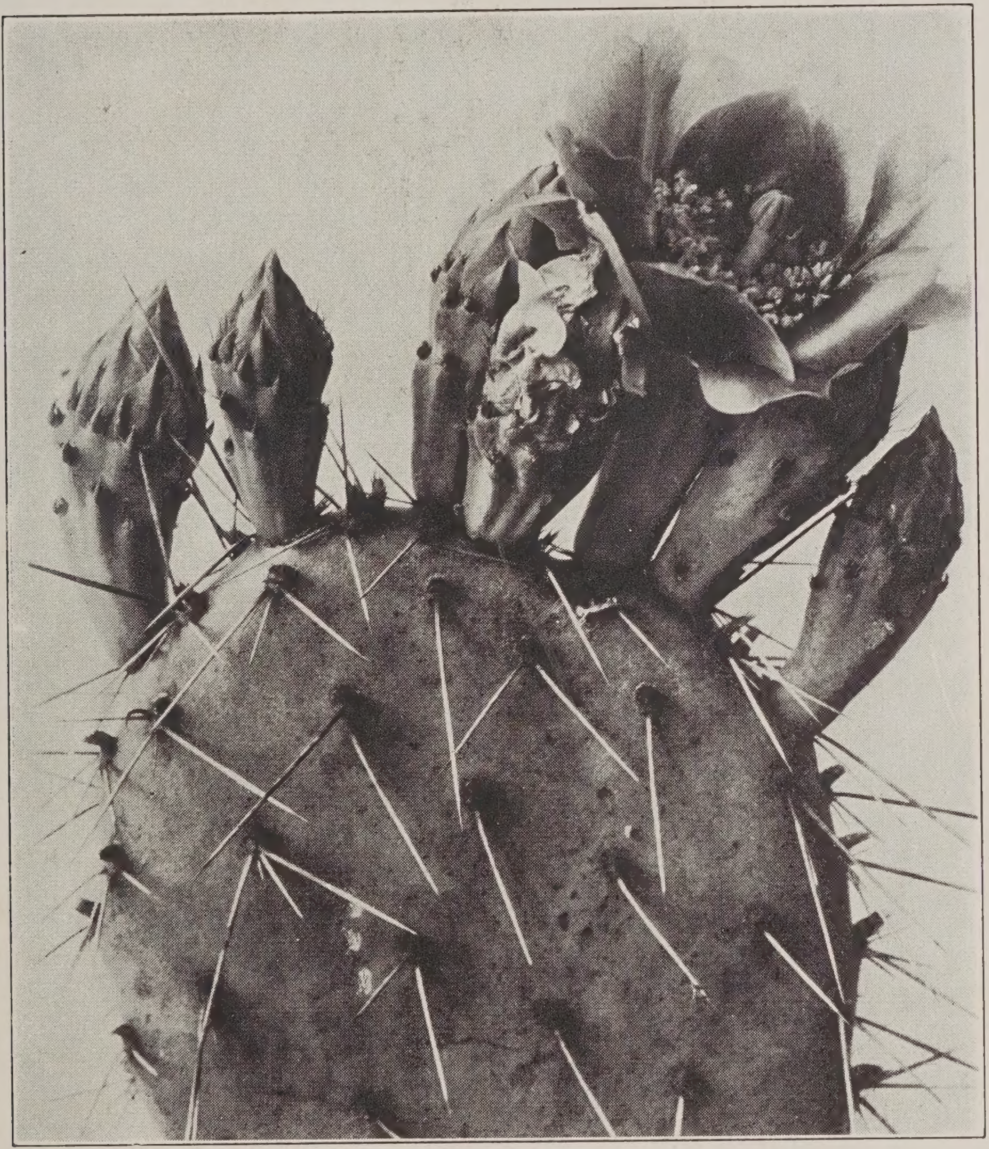
OPUNTIA TRICHOPHORA

spines of the O. erinacea are usually 2 to 3 inches in length but give to the plant an interesting and unique appearance. Several others, near this in relationship, have similar spines, though not so striking as in this species. The O. trichophora, found in New Mexico and Texas, is one of these. Its blossoms are yellow tinged with red in the center.

One of the California species, O. vaseyi, shows an interesting variation in color, its flowers being of a brilliant magenta pink. This is a common variety found in southern California, generally in the interior valleys.

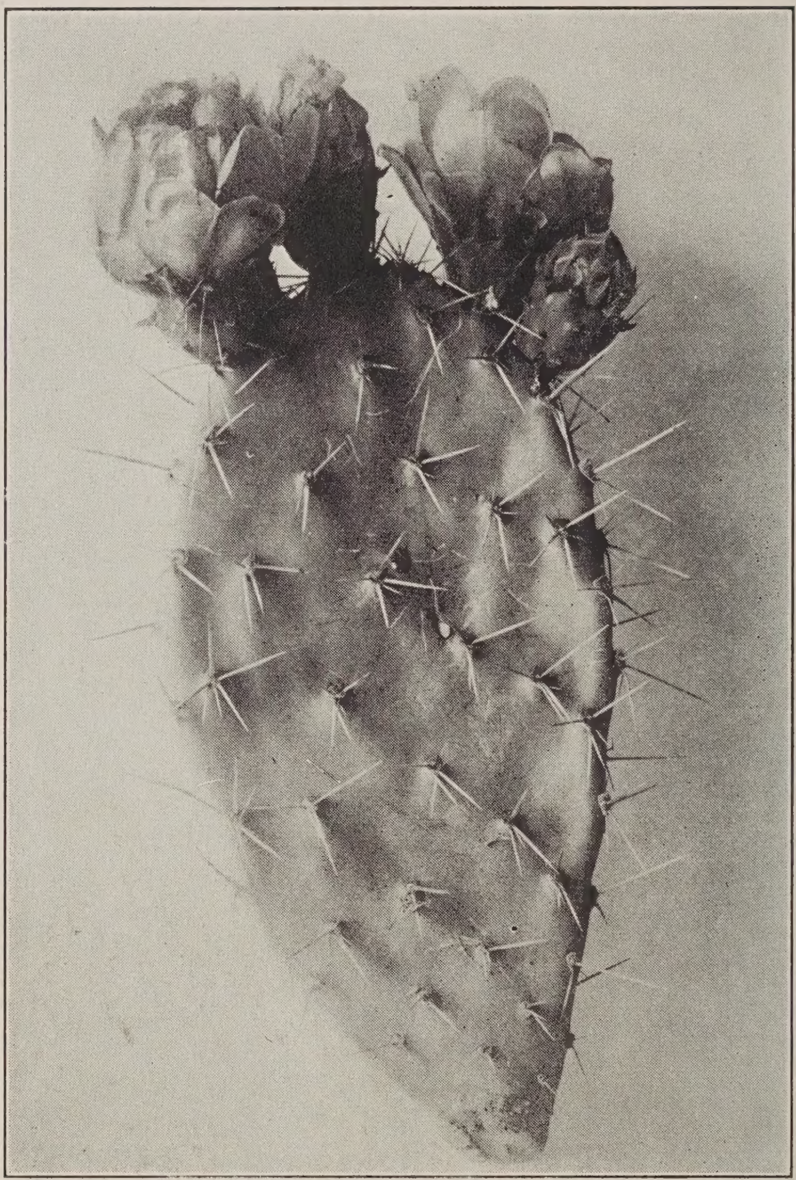
The shore Cactus (O. littoralis) is another Californian, following more or less the shore line, with its bright green pads and yellow flowers tinged with red.

There seems to be a great deal of confusion existing in the identification of several of the Cacti of this general type; botanists differ and classifications seem to run together. It would appear that there is a probability of their having been crossed in many instances, and



Opuntia vaseyi

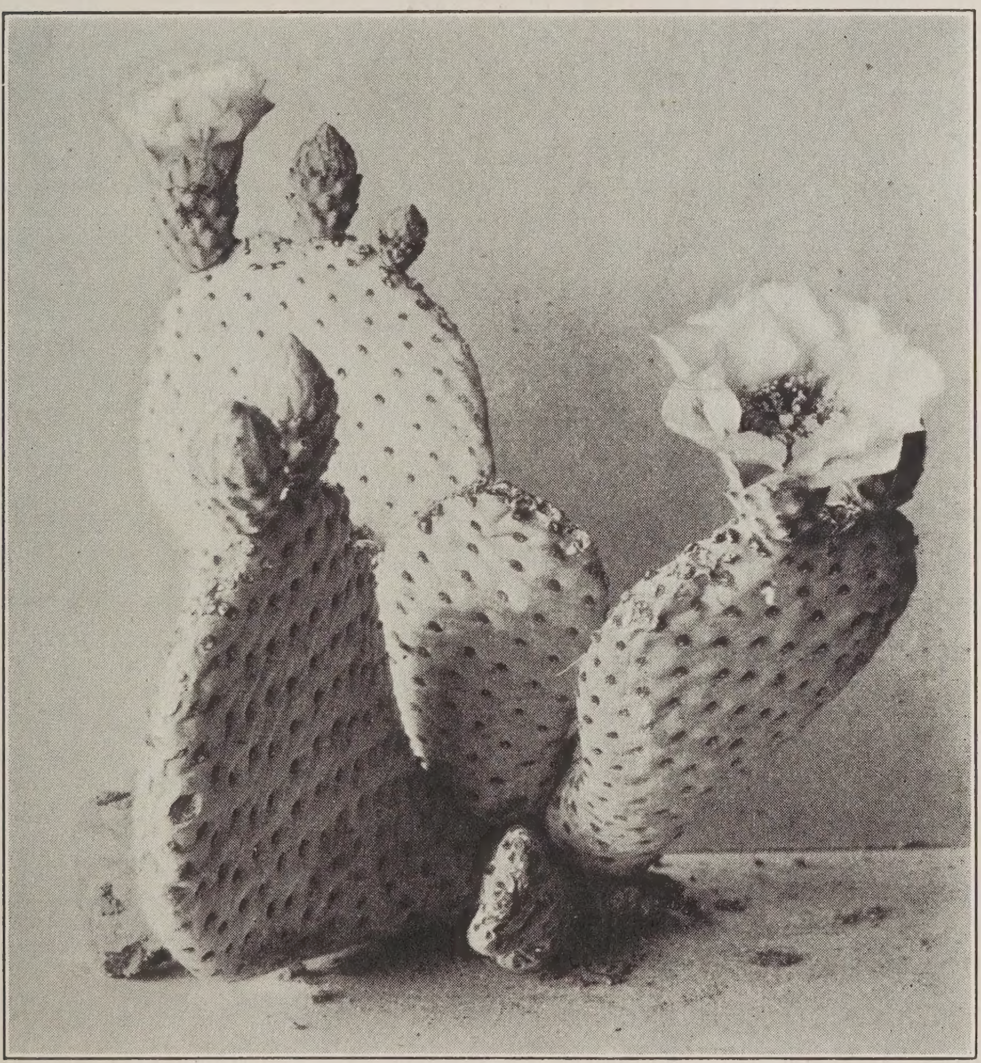
Synonyms by which this Cactus have been known (O. magenta, Griffiths, and O. rubiflora, Davidson) are in allusion to the beautiful glowing pink of its blossoms



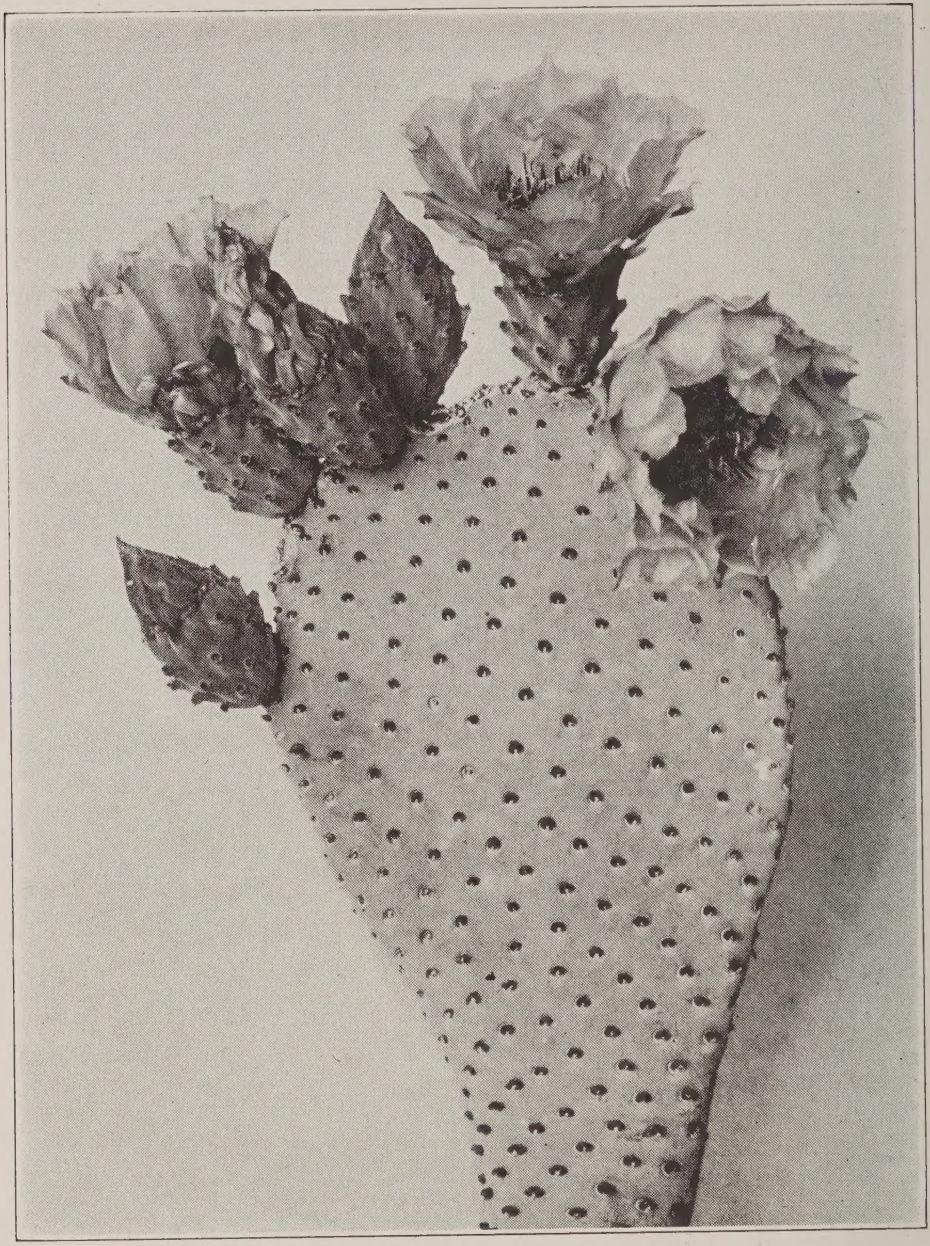
OPUNTIA LITTORALIS (Shore Cactus)
Pads bright green; flowers yellow, tinged with red

that many natural hybrids have emanated therefrom. It may perhaps be that O. littoralis should be called occidentalis or engelmanni or lindheimeri, as they all seem to be pretty well confused, different authorities calling them now by one name and now another. This may perhaps serve as a representative of this group.

A group quite apart from the others in appearance is that of which the O. basilaris is representative. Coming upon a plant that seems to be entirely inoffensive because of the absence of the spines, which in so many species stand as guard and warn the passerby to beware,



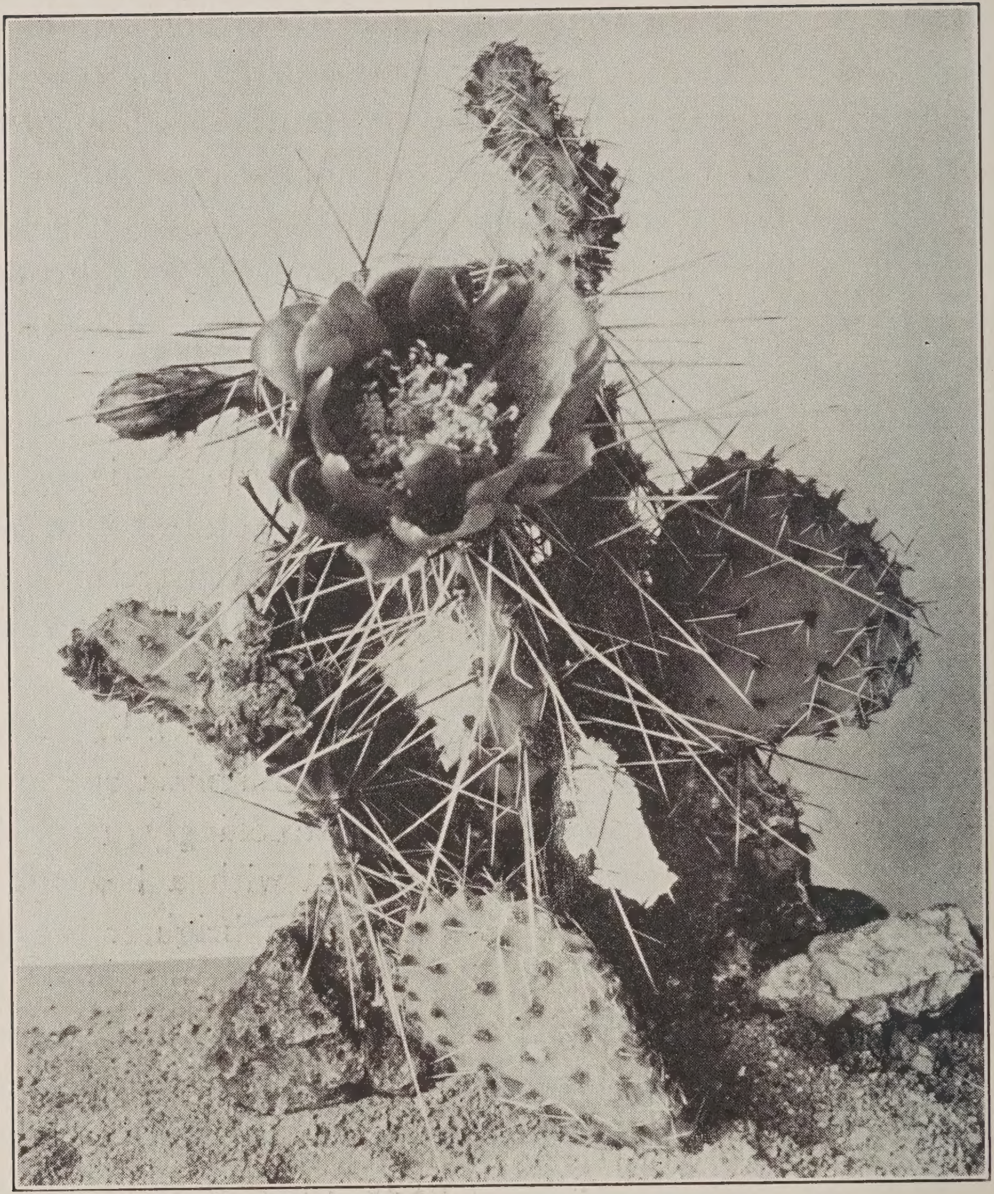
OPUNTIA BASILARIS (The Beavertail Cactus)
Lobes gray-green or tipped with purplish-pink. Flowers bright magenta pink



OPUNTIA BASILARIS
A single lobe bearing half a dozen flowers and buds

one may inadvertently and to his sorrow investigate the seeming exception to its well-armed neighbors. In every areole there is clustered a little bunch of minute and inoffensive looking glochids well able to define their character; for at a touch of the hand or by clothing, they become detached and are transferred en masse, becoming a source of annoyance or torture, according to circumstances or one's disposition. For each one of these hairlike, tiny, innocent appearing objects is a barbed spicule that hooks itself into the flesh and, though not doing great damage because of their minute size, still remind one of their presence by innumerable little needle pricks, which are highly irritating. Of course, these glochids are present in other species but are ignored more or less because their more formidable armament of spines, sheathed or unsheathed, render one more or less oblivious to the minor armament. Two species of this group are Californians and one is a Texan.

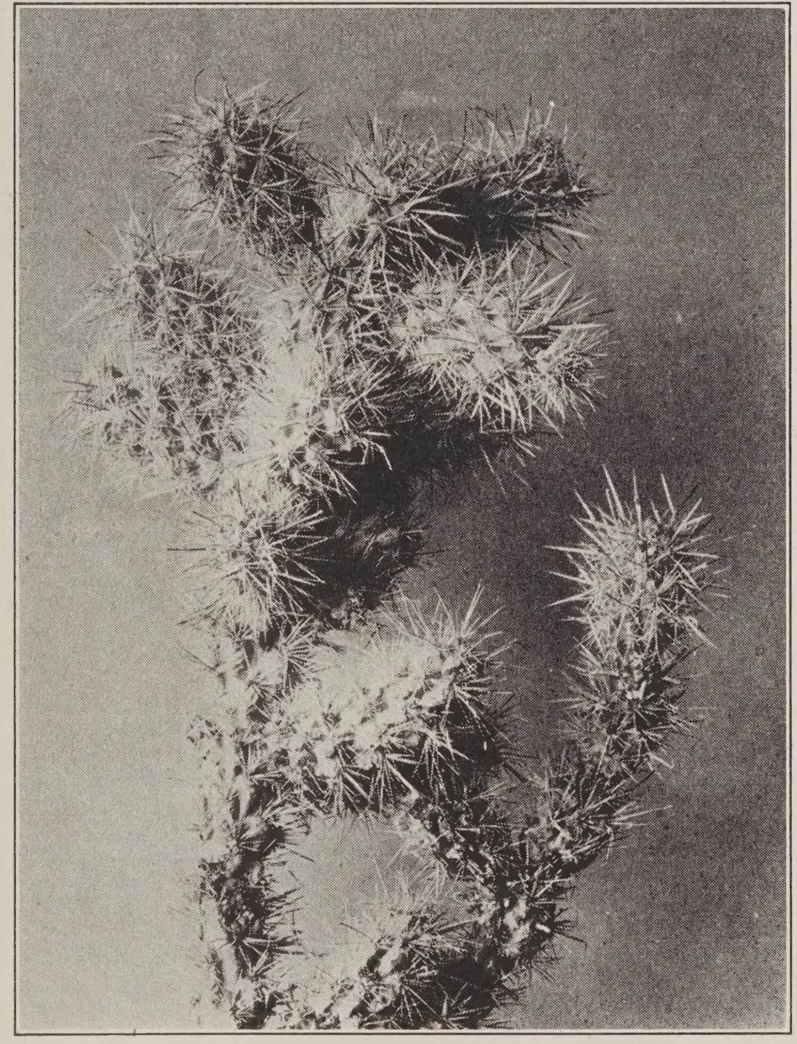
O. treleasei of the Tehachapi country, and O. basilaris of the San Diego mountains, are the California species. The first is a bluish-green with exceedingly minute glochids (barbed spicules), and graced with a beautiful rose colored flower. The second is of a brighter green with gray tones, and often with rose-purple appearing in the coloration of the pads; the flowers flaunt themselves in the brightest magenta pink. The gray-green joints have a wrinkled appearance and the young pads resemble a wrinkled peach skin. The little bunches of glochids are more noticeable than in the first and are of a rust color. The basilaris group is distinguished by its manner of growth, the joints spreading from the base (whence the name). Like all the Platyopuntias the blossoms are to be found on the edges of the joints and, spreading from the base, a huge rosette is formed with the edges a mass of bloom. It is most beautiful when in blossom.



OPUNTIA CHIHUAHUENSIS

The Texas variety is of a blue-gray with brown glochids and yellow flowers.

It would seem almost ridiculous to speak of the Opuntia as a foliage plant when, as a matter of fact, there is no foliage, the small inconspicuous leaves soon falling, so that the foliage is actually non-existent. Yet, there are some that are as decorative in their coloring as are many of the so-called foliage plants; this because of the varied tones of their pads or joints. The Opuntia santa-rita is one of these; this is an Arizona species and one of the most attractive in cultivation. It has beautiful pink and purplish tones which, together with its blossoms,

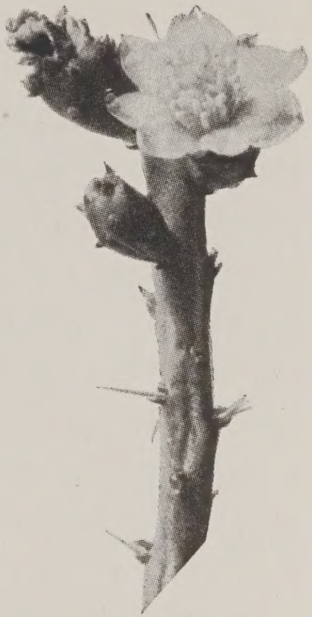


THE WICKED CHOLLA OF THE SOUTHWEST
(See page 35)

make it most attractive. A similar one of New Mexico and Texas is O. macrocentra, a beautiful and exceedingly showy species. Its lobes show blue, purple and pink in its coloring, and the spines, brown and shining with white tips, add to its striking appearance. The flower is yellow with a dark red center. (See frontispiece)

Of the cylindrical forms, popular opinion is not so high, for here belong the hated Cholla of the Southwest; indeed, all forms of the Cylindropuntia more or less go by this name in various localities. And of them is the famous Jumping Cactus. A frequent question of visitors to the Southwest is, "Is there such a thing as a Jumping Cactus?" No, if taken quite literally; they do not actually jump, but so much do they appear to jump that it may be easily imagined they do. The ultimate joints are so easily detached, and so easily affix themselves to the passerby, whether man or beast, that it is a little hard to know how this happened unless through their literally jumping. And, alas, with what pain and sorrow are they detached from the flesh of the unwary recipient! Nevertheless, in spite of the unpleasant manner in which these most unwelcome intruders force themselves upon one's attention, there is in them much of interest to study and much to admire. One of the interesting and wonderful constructions which claim our attention is the sheath, often loose and papery, which covers the wicked barbed spines. For the barb of the glochid is repeated, magnified many times, and the result is a thing of torture.

Nor are they as attractive as the Platyopuntia. Some of them, however, are decorative. The O. arbor-

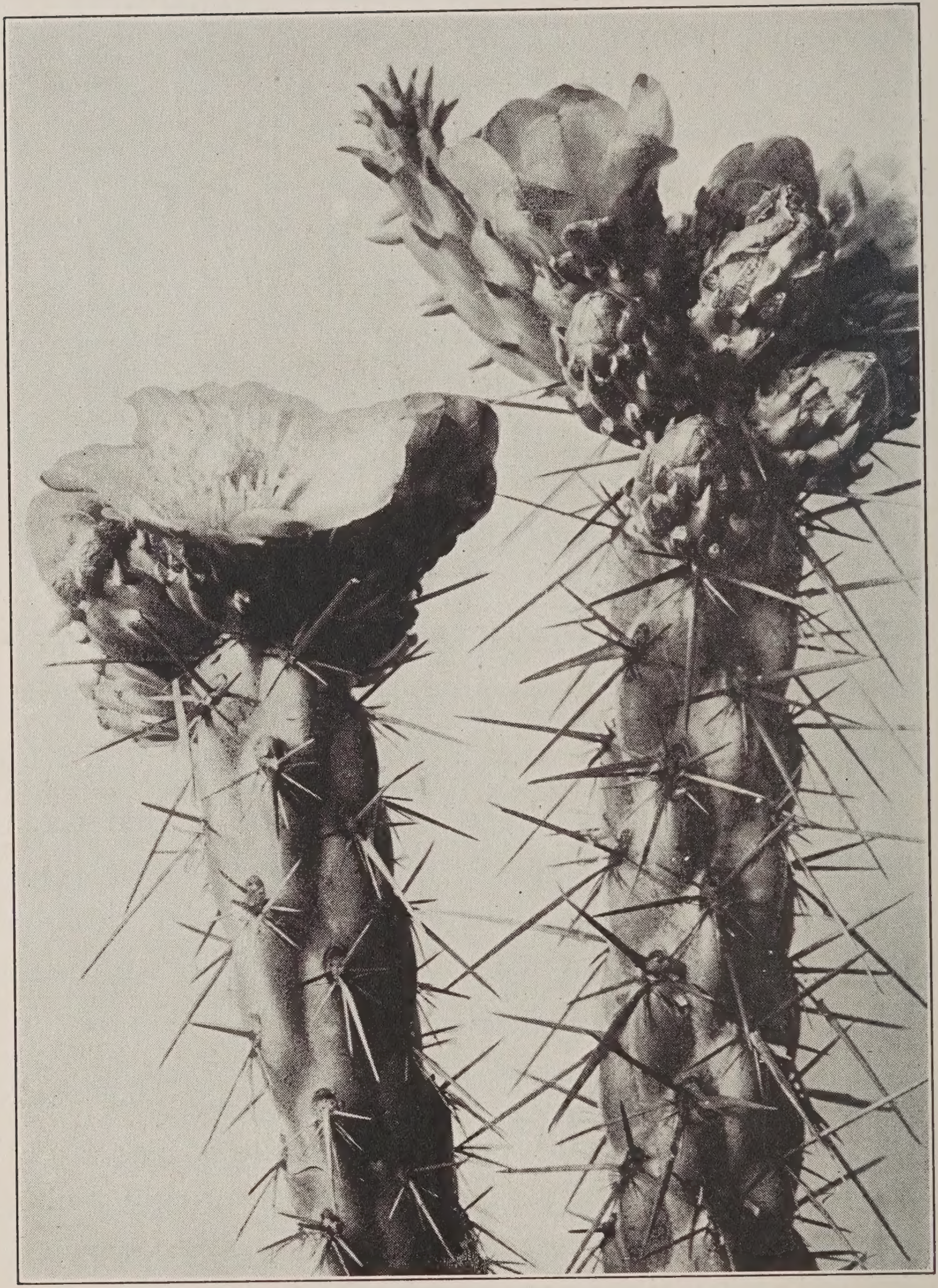


OPUNTIA LEPTOCAULIS

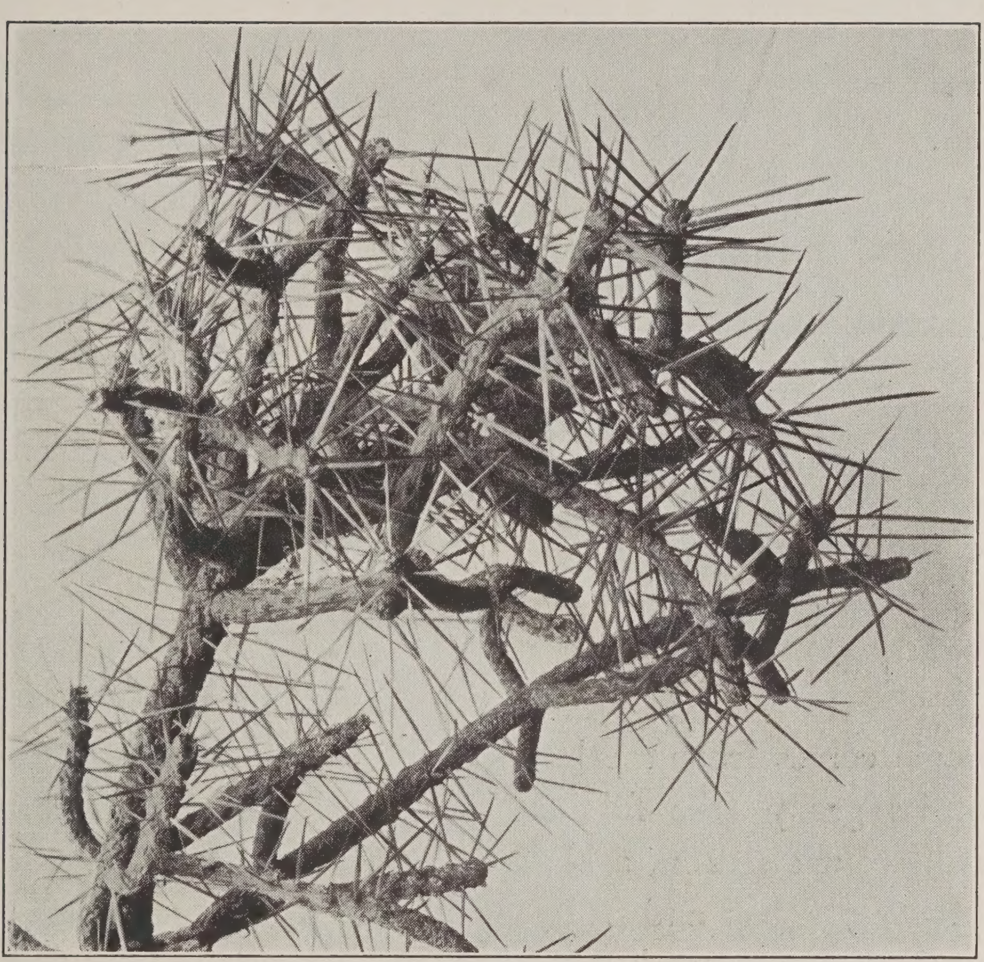
escens, otherwise called the Cane Cactus, treelike plant of Texas, Arizona and New Mexico, is as showy from its bright red and yellow fruits as it is from its blossom. It can be seen for some distance because of these brilliant fruits, and is sometimes called the Candle Cactus. Another more slender in form is the O. leptocaulis, attractive by reason of its bright scarlet fruits in little clusters. Its fruits are proliferous, one growing from the other. This is one that is often seen in cultivation because of its fruits and its slender habit of growth.

The O. versicolor (Arizona) is interesting from the characteristic indicated by its name; namely, that often flowers of varying color are to be found on the same plant or branch. The blossoms vary in color through yellow tones to dark terra cotta. It is a high growing plant, sometimes aborescent.

Some of the California species are worthy of note. There is the O. parryi, with its clear yellow flowers and pink-tinged buds. Also O. echinocarpa (prickly fruit), its flowers a peculiar shade of greenish-yellow touched with red at the tips of the petals; the blossoms are clustered in tight bunches at the ends of the joints, later forming a perfect bunch of spines.

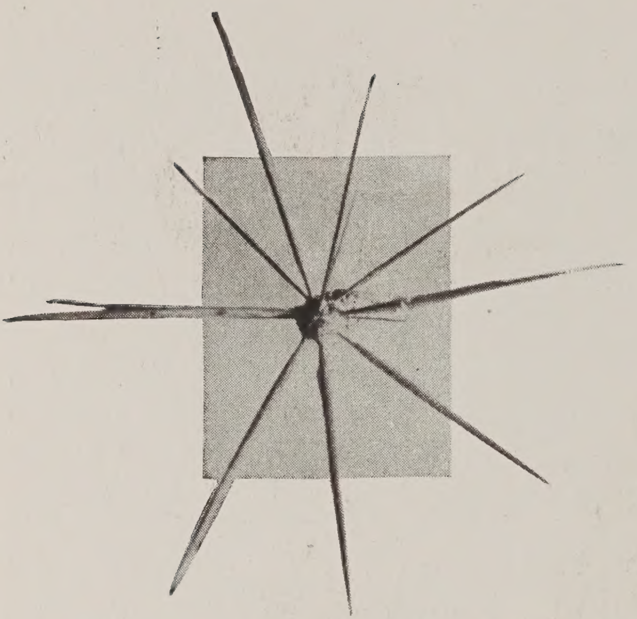


OPUNTIA PARRYI



Opuntia ramosissima

An odd little one is the O. ramosissima (much branched); its name is very fitting; it was formerly known as O. tesselata, which also seemed a most appropriate name as its tubercles are low, close together, and diamond shaped, giving the stem the appearance of being covered with tiny, diamond shaped plates. It is a very slender jointed species, sometimes entirely without spines, and again with them very abundant. When spines are present, they are long, sharp, barbed and sheathed. It

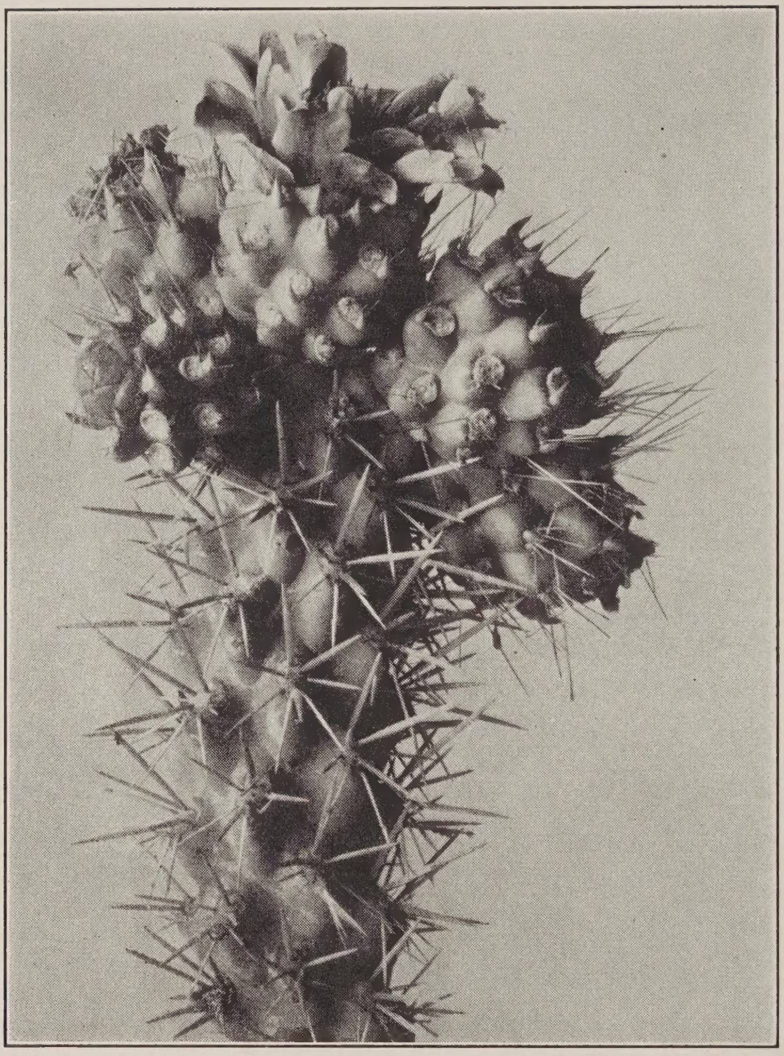


SPINES FROM OPUNTIA RAMOSISSIMA

is more woody in growth, and is rarely cultivated; it is said to be difficult of propagation on account of the very woody stems; one was readily rooted by the writer, however. The one which especially carries the stigma of the name "Cholla" on the Coast is the O. prolifera. Its name comes from the habit it has, together with others of its group (the fulgidae), of sending forth from its fruit of one season, a blossom bud which, becoming successively flower and fruit, again repeats the performance, until the fruits, each springing from its predecessor, form chains, comprising sometimes many individuals. This cactus grows in thickets about the Coast. It has a salver shaped flower, maroon in color, fading to chocolate brown. The fruit seldom, if ever, comes to perfection and germinates; but if a blossom falls, becoming detached from the plant, it will root and, instead of a new flower bud coming from it, it will send out vegetative shoots and, lo, a new Cholla has come into being. This unique method of propagation is the subject of a most interesting monograph issued by the Carnegie Institution, *The Fruit of Opuntia Fulgida*, by Dr. Duncan Johnson of

Opuntia echinocarpa

Johns Hopkins. After describing its method of propagation from the rooting of the fallen fruits and subsequent vegetative growth, Dr. Johnson states that, so rarely that it might be said never does a fruit still attached to the plant send forth vegetative shoots. Just this rare thing did occur, however, with the speci-



OPUNTIA PROLIFERA

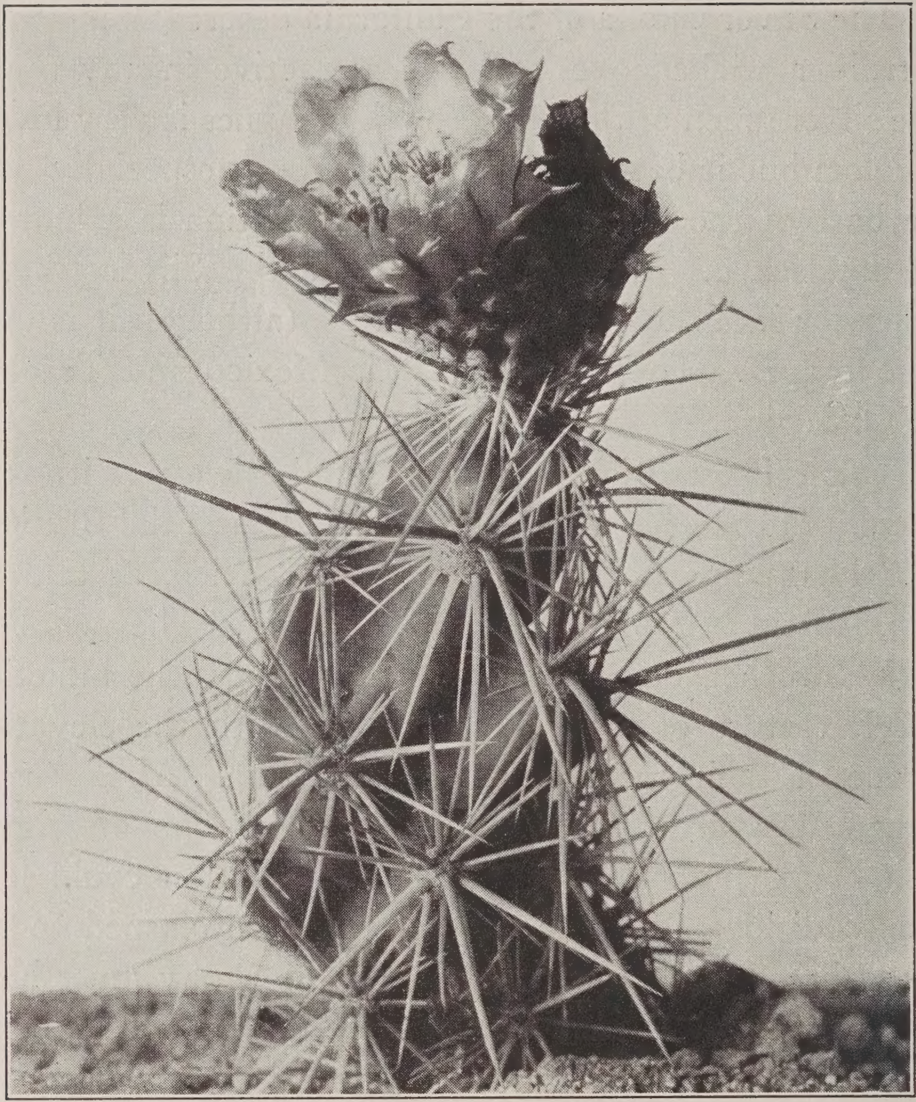
men pictured. The flower fell from the plant as it was placed before the camera; thrown on the sand with the branch from which it fell to await a record of its color, it rooted and a year later was a flourishing plant. Not only did this to be expected thing happen, however; the joint itself rooted and one of its fruits, still attached, sent forth the following year, instead of the expected flower bud, *two* vegetative joints. Thus does the unexpected happen!

The Silver Cholla of the California desert (O. bigelovi) is truly a wicked one, and not attractive in any sense. The silver green of the new growth of spines is very lovely in color; but it becomes blackened in age, especially near the base of the plant, and in this condition is a blot on the landscape. I hold no brief for the Silver Cholla, either for its beauty or its usefulness (although it is used as a forage). The Cholla of New Mexico and Texas is the O. fulgida.

There is associated in my mind always with the thought of the Cholla the story of the Penitential Brothers (Los Hermanos Penetentes) of New Mexico, as told by Mrs. Austin in *Land of Journeys' Ending.* The members of the Brotherhood observe Holy Week by the infliction of self torture of every kind, ending with the elevation of one of their members upon the cross. Mrs. Austin witnessed a procession of the Brothers, one of whom, with hands manacled so that no temptation could lead him to dislodge his terrible burden, bore clasped to his naked breast a bundle of Cholla! The agony must have been unspeakable; it is hardly to be understood as being within human endurance, as the flesh is penetrated at a touch with those wicked instruments of torture, the barbed spines of the Cholla.

A group of the Cylindropuntia that is not strictly cylindrical in form but is mereging into another genus, is the clavate or club shaped. The O. stanlyi, a New Mexico species, is here pictured.

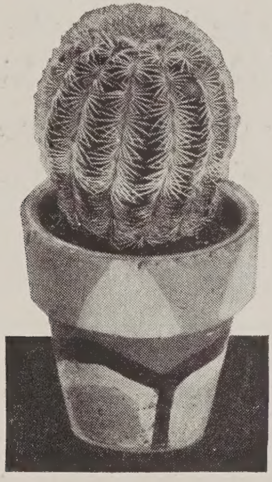
The genus into which it leads is the Tephrocactus, none of which are indigenous to our Southwest, and consequently do not interest us here.



OPUNTIA STANLYI
Flowers clear yellow; sepals tipped with red and pointed

It may readily be seen that if the Opuntias are less preferred in cultivation than some of the other Cacti, it is not because of any lack of beauty, or variety, or interest in very many directions. It is, indeed, rather difficult to know to just what one compelling reason may be attributed its comparative neglect as contrasted with other Cacti. Many of them are highly ornamental; they are most widely distributed and so will more readily adjust themselves than many others to varied climatic conditions. They vary in size to such an extent that though some are small enough to be included in a window garden, others perhaps are of too vigorous growth to be admitted, except in large grounds, where they make an admirable background for the lower growing specimens. Some few collections have rather specialized in Opuntias with surprisingly good effect.

To the student, to the botanist and to the horticulturist alike, they present many interesting angles for study; and many of them are pleasing to the grower and the observer for their beauty, their usefulness or, perhaps as concerns some of them, their oddities.



CHAPTER III

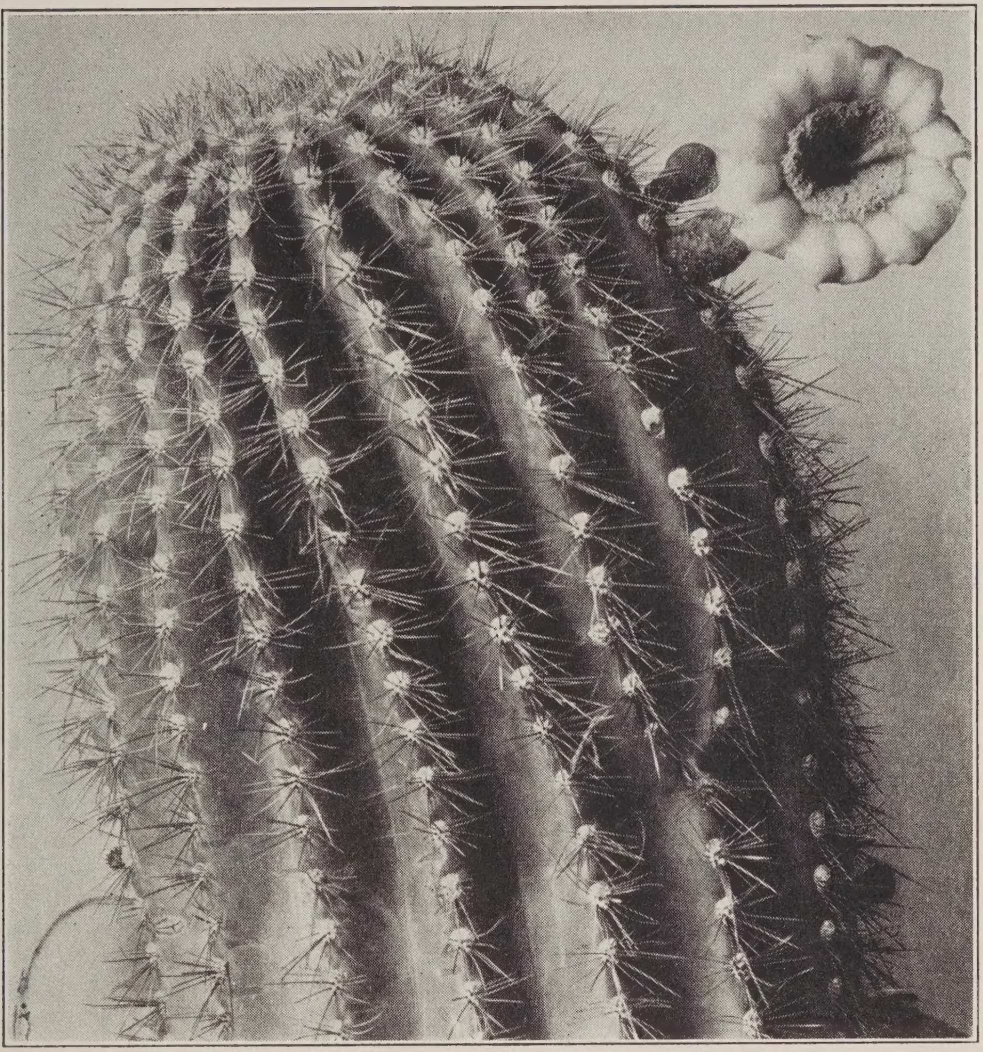
The Cereus

Echinocereus—Echinocactus—Coryphantha—Mammillaria—Rhipsalis

Cereus is from the Latin, and means waxy. The name was given, in all probability, to the first species described, because of its fancied resemblance to a wax torch, the straight column and the branches paralleling the trunk, suggestive in their candelabra-like form.

In their classification, Britton and Rose have made the great Cereus tribe widely inclusive, and we will find grouped as sub-tribes many widely differing genera. In this classification will be found included plants of strongly differing character and habit. While many of them are not natives of our country, those indigenous to the United States are varied, numerous and interesting; for they include not only the columnar forms of the Southwest, but many representatives of that interesting host known to us as Echinocereus, Echinocactus, Mammillaria and Coryphantha.

Of the wonderful treelike columnar Cacti, there are few native to the United States. Plentiful across the border in Baja California and on the mainland of Mexico, where they form the famed forests of Cardon, they are found sparingly in the United States, and confine them-



Carnegiea gigantea
The giant Cactus of Arizona and Arizona State flower
This specimen, a branch about fifteen inches in diameter, and taken about nine feet from the ground, came from the vicinity of Yuma. The blossoms, identical in every other respect, appear on the side of the stem and not on the top, as is usual in this species

selves to limited areas in Southeastern California and Southern Arizona. The one most widely known and most widely spread in the United States is the Carnegiea gigantea (Cereus giganteus) the giant Cactus of Arizona and its state flower. It is also known, perhaps more widely, by its native name, Sahuaro or Saguaro. There has been set aside by the United States Government near Phoenix, Arizona, an area of over two thousand acres as one of the national monuments, the Papago Saguaro. It is found only in isolated spots in California, along the Colorado River. Attention has recently been drawn to a group of them near Yuma, California, which may be protected by the State as a means of their preservation.

Engelmann describes them, and in the collection of his writings, published in 1889, is found a wonderful steel engraving which gives a graphic idea of their structure. The trunk of this treelike Cactus (from 18 inches to 2 feet in diameter) is formed of rods held together in the form of a cylinder, and is in reality a cistern. These trees often rise to the height of from 30 to 50 feet in a single straight column, or with branches which parallel the main trunk in a candelabra-like formation. These Cacti are of extremely slow growth, especially during the earlier periods of their life, and a specimen of the height indicated would probably have an age of from 150 to 200 years. Because of its slow growth and its great economic value to them, the Indians hold the Sahuaro in high esteem and the destruction of one is viewed by them as a calamity.

And yet they are sometimes wantonly destroyed by the tourist sightseer, being made literally into a torch, by setting fire to the spines, the flame following the length of the trunk and in a few moments destroying the growth of centuries, this to afford a momentary spectacle!

They frequent gravelly places and stony hillsides and their roots extend laterally for 50 feet, anchoring them firmly; and to the normal mind they convey a sense of wonder and awe.

The trees are not easily injured; if bruised or punctured, one will bleed but will soon sear and callous,

CARNEGIEA GIGANTEA (Giant Cactus of Arizona) unless the injury occurs during the rainy season, when decay will quickly ensue. The trees are inhabited by the Gila or Sahuaro woodpeckers, but the excavations for the nests callous and apparently work no injury to the tree.

It is no wonder that these Cacti are loved and revered by the Indian, for they are to him of vast importance economically. They furnish him, in the rods of which they are constructed, material for building his house, for rafters of the adobe structures, for bows and arrows, and for many other purposes. The wood is light and soft, solid and susceptible to a beautiful polish; it is indestructible in contact with the soil and is used for fences.

But its greatest importance to the Indian is in its food supply. The flowers are at the top of the tree or at the end of the branches. They are white, waxy, a tight close flower in form, and with a multitude of stamens. The fruits, which are red, split when they ripen, giving rise to an erroneous report of a red flower. The fruit ripens in June or July, and so great a place does it hold in the economic life of the Indians that, with its fruiting, they make a fiesta, and date their year with its harvest. In *New Trails in Mexico** is given a most interesting account of this fiesta held by the Papago Indians. The first fruits are made by them into a wine used in the ceremonies incident to the sacred fiesta. The wine produced from this fruit would fall far short of fulfilling the requirements of the Volstead Act, and it is perhaps to the best interests of the perpetuation of this sacred fiesta that its observance is on Mexican soil! After the conclusion of the rites and the drinking of the wine the harvest is gathered. The long rods of the trunk are utilized in garnering the fruit, which is high at the top of the tree or branches. The fruit is eaten raw, or stored as a staple food product in the form of syrup, preserves, or as dried fruit.

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*Carl Lumholtz, 1912.

The seeds are ground, producing an oily substance, used as a condiment. A pancake with butter substitute from the seed of this fruit, and with a syrup or fruit butter, would not be so bad, even to the sophisticated taste of the white man.

The water content of these trees varies very greatly with the changing seasons, and the beautifully fluted columns are so constructed as to accommodate this variation.*

This Cactus is also known by the name of Pitaya or Pitahaya, which name, however, is used rather indiscriminately to indicate any one of the columnar Tree Cacti, sometimes qualified by a descriptive adjective, as the Pitahaya Dulce, or Sweet Pitahaya, by which name the Lemaireocereus thurberi is particularly known. This is found only sparingly on this side of the border, but abundantly in Lower California and in the Mexican mainland. The fruit, as indicated by the name, is sweet and rather cloying in its flavor.

Florida boasts two species of the Cephalocereus: C. keyensis and C. deeringi, the latter a very tall, slender plant, whose blossoming time is late afternoon.

One other of the columnar Cacti only is found sparingly in this country, in Southern Arizona, near the border, the Lophocereus schotti. This is a favorite in

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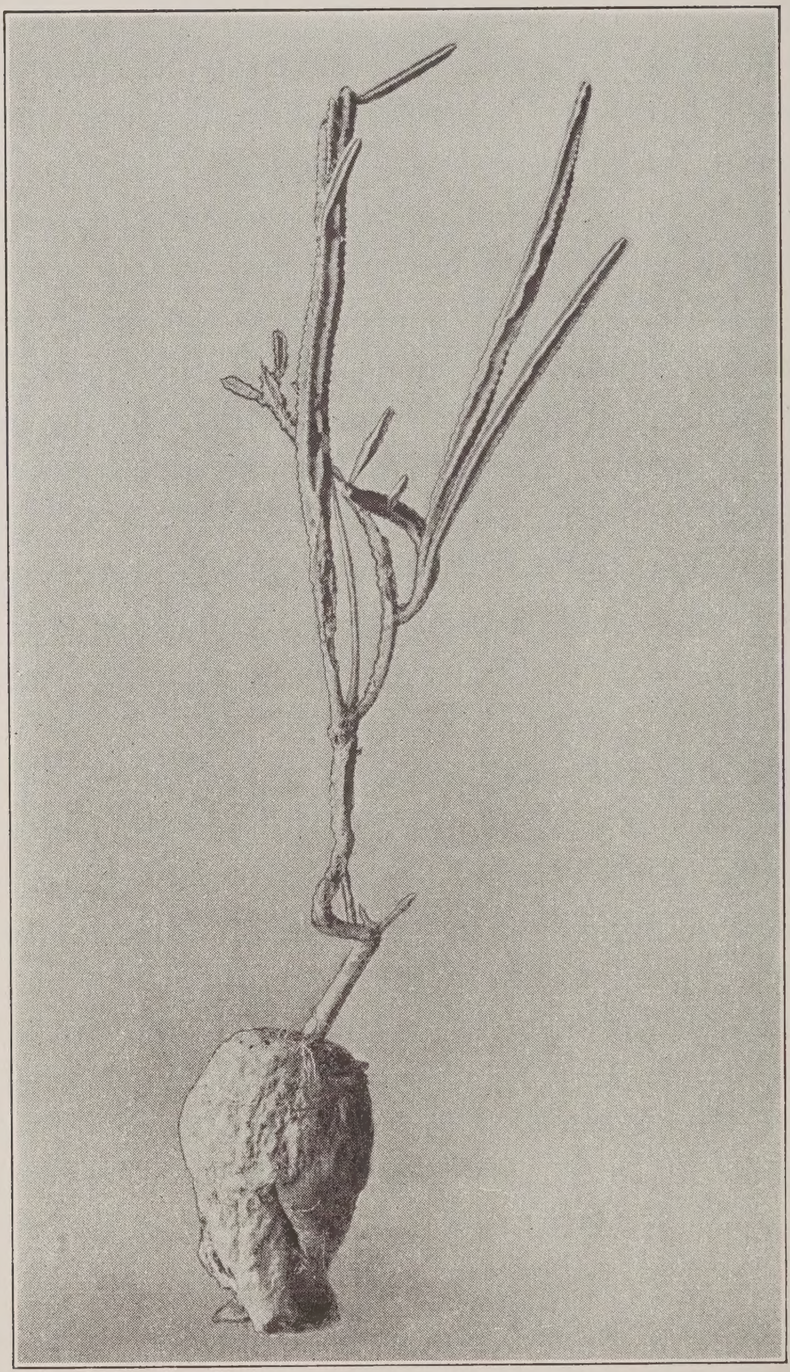
Water Balance of Succulent Plants, by D. T. MacDugal and E. S. Spalding.



PENIOCEREUS GREGGI (Sweet Potato Cactus)
Main root of this specimen about six inches long and six inches in diameter. Stems slender gray-green

cultivation because of the unusual appearance caused by the abundance of long, gray bristle-like spines.

In San Diego County (California) near the Coast, and on the border line of Baja California, and found only in this locality in the United States and the Channel Islands, is a peculiar Cactus growth, the Bergerocactus emoryi (syn. Cereus emoryi). It grows along the ground and sends up branches, forming a thicket. It is very spiny, a peculiar shade of yellow-green when young, becoming dingy in age.

The flowers appear on the side of the stem, the buds, like upholstery buttons, opening into a greenish yellow blossom. The fruits are in the form of brown, spiny burrs, and are persistent. The illustration (facing page 88) shows the buds and blossoms, while the fruit of the previous season is still on the plant.

Arizona has a most interesting plant the Peniocereus greggi (Cereus greggi). Of slender growth, it is lost in the surroundings until it blossoms. It is a night bloomer with extremely sweet scented blossoms, and by reason of this and of the very luminous quality of its blossoms, it makes its presence known in no uncertain terms at its flowering time. Tradition says that its time of blooming comes for all its members in a single night, and that for this once only may it be found. It flowers in June. Its root system is unusual; it comes from a tuber, sometimes small and sometimes weighing as much as 125 pounds. From this fact it is sometimes known as the Sweet Potato Cactus.

We have also of the more slender forms, the Acanthocereus pentagonus (Florida and Eastern Texas); two

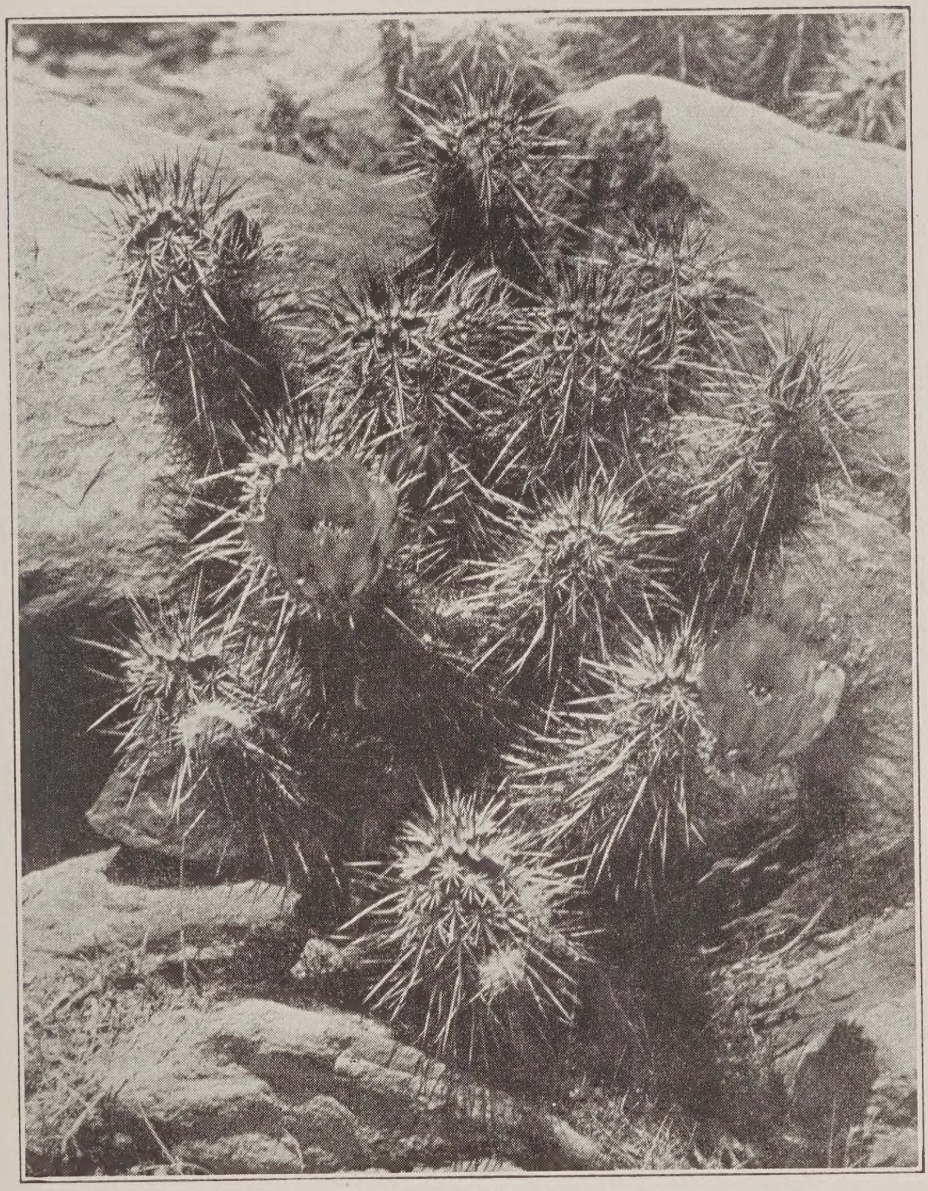
Harrisias from Florida, one of which is well known in culture (Harrisia fragrans); a Wilcoxia (W. poselgeri) from Southern Texas with a pretty pink flower. This is well known in cultivation usually grafted on a more robust plant.

The still more slender vinelike Cacti, including the several species of Night Blooming Cereus, which are probably more widely cultivated than any other Cacti, are mostly tropical in their origin and find practically no representation among those native to our country. A single exception, perhaps, may be the Selenicereus spinulosus, listed by Britton and Rose as being found in Texas, but which is not on the list of Texas collectors.

ECHINOCEREUS

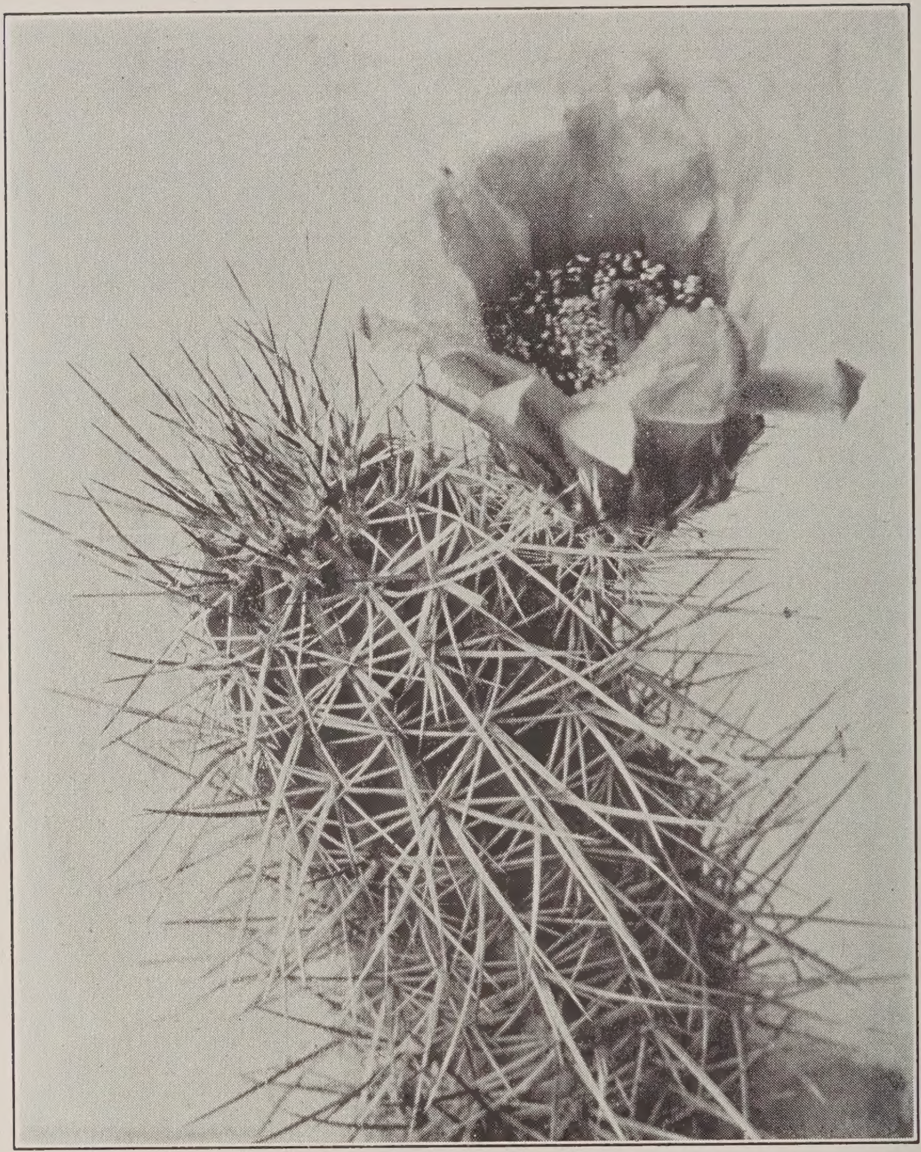
Of all the Cacti possibly none have more of appeal and of real interest than do the Echinocereanae, unless perhaps some of the Mammillarias. Not quite so awe inspiring as some of the larger treelike growths, not economically of the importance of some of the larger Cereus and the Opuntia, they have an appeal to the grower that is irresistible. They are many in number of species and vary at least sufficiently to insure an ever active interest.

Some are high, up to twelve inches, and fairly bristling with spines to the extent that they seem to earn for themselves, fairly enough, one of their common names, Hedgehog Thistle. The Torch Cactus is a local name by which they are also known. Of this description are those two which are California's, Ec. engelmanni and Ec. mojavensis, the latter, as its name implies, the char-



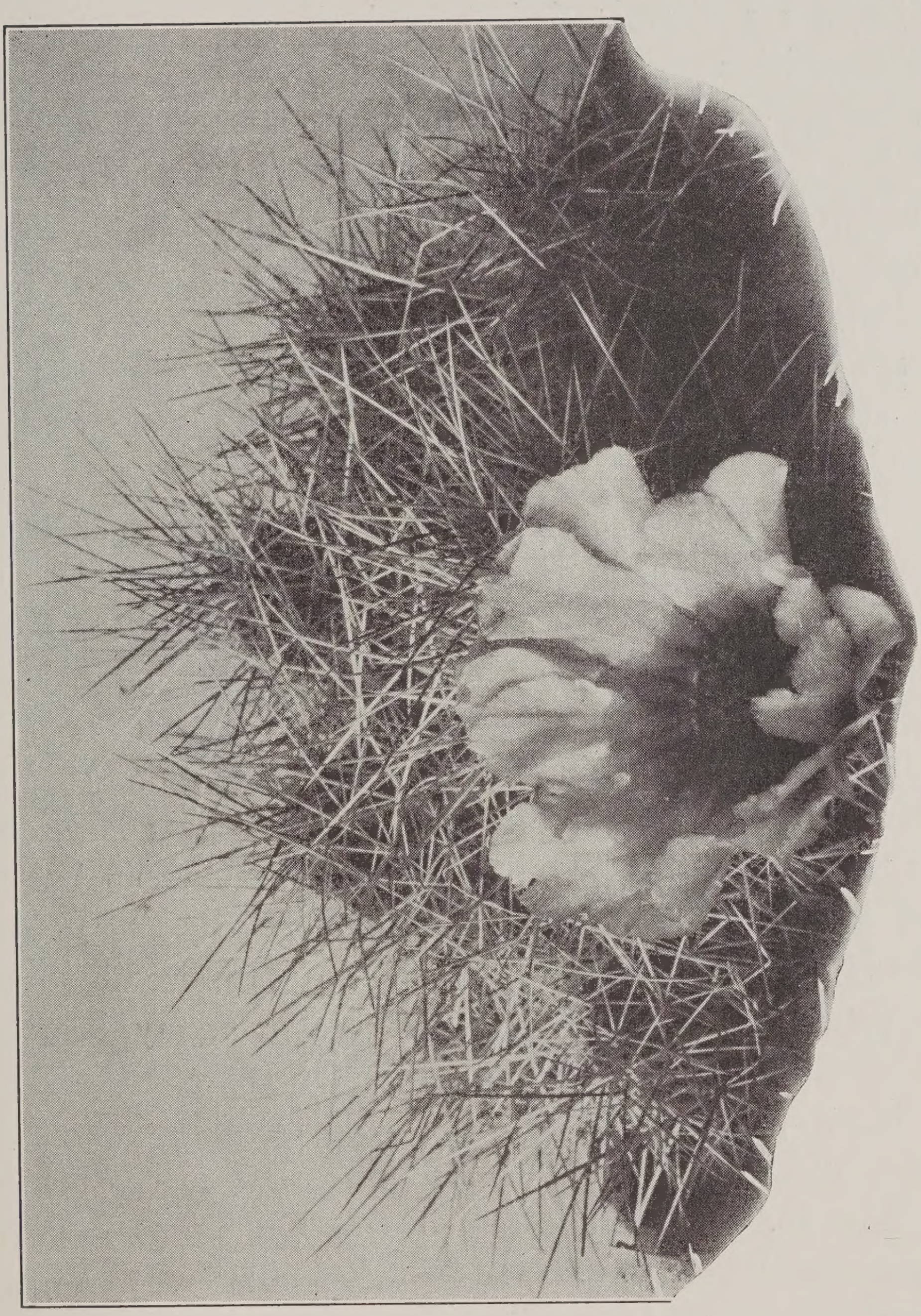
ECHINOCEREUS ENGELMANNI
As it grows in its own environment

acteristic one of the Mojave desert, while Engelmann's is found South, bordering the Colorado desert. The Engelmanni is found in stony soil or in the clefts of rock. The stems, comparatively few in number, usually two or three but up to as many as 20, all springing from the



ECHINOCEREUS ENGELMANNI

single root, stand upright, about 10 inches in height and 3 inches in diameter. The spines vary considerably in this species, sometimes dark brown and sometimes white. Several varieties are sold by florists, under different names, showing this difference in the color of the spines. The blossoms, of a glorious rose purple and 3 inches or



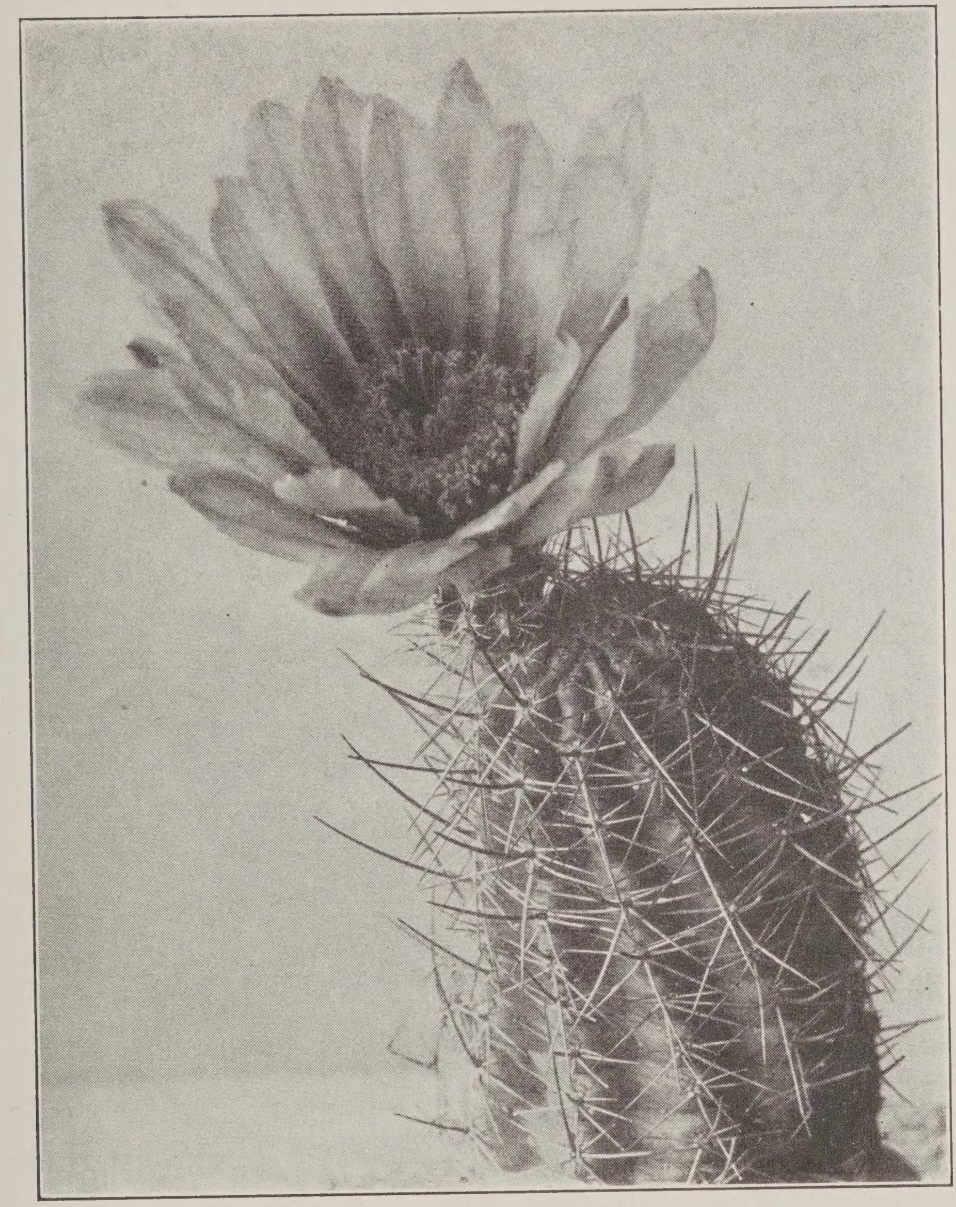
Echinocereus stramineus

more in diameter, are most showy, with their brilliant color, yellow stamens and the feathery green stigma lobes which are a characteristic of this genus. The fruit is scarlet, with a network of white spines, showing a beautiful fretwork; the spines are readily detached when ripe.

The Ec. mojavensis is similar in many respects. The stems are shorter and more numerous, sometimes forming mats of several hundred. Its soil requirements are similar, but the blossoms, in place of the brilliant purple of the Ec. engelmanni, show an equally bright scarlet. Ec. stramineus of New Mexico and Texas has a similar habit of growth. Its spiny heads, often numbering into the hundreds in a single clump, are light green, almost completely hidden, however, by the long, slender, straw colored spines. In their blossoming time the bright magenta flowers make a brilliant showing. Watching the buds form it seems absolutely impossible that they should bloom, so surrounded are they by the long spines, but day by day they are pushed away and, at last, one day they are no longer on guard and the blossom bursts forth in all its splendor. A plant covered by these blossoms is a sight to remember. The fruits are edible and the plant in consequence is one of the many bearing the indefinite name of Strawberry Cactus.

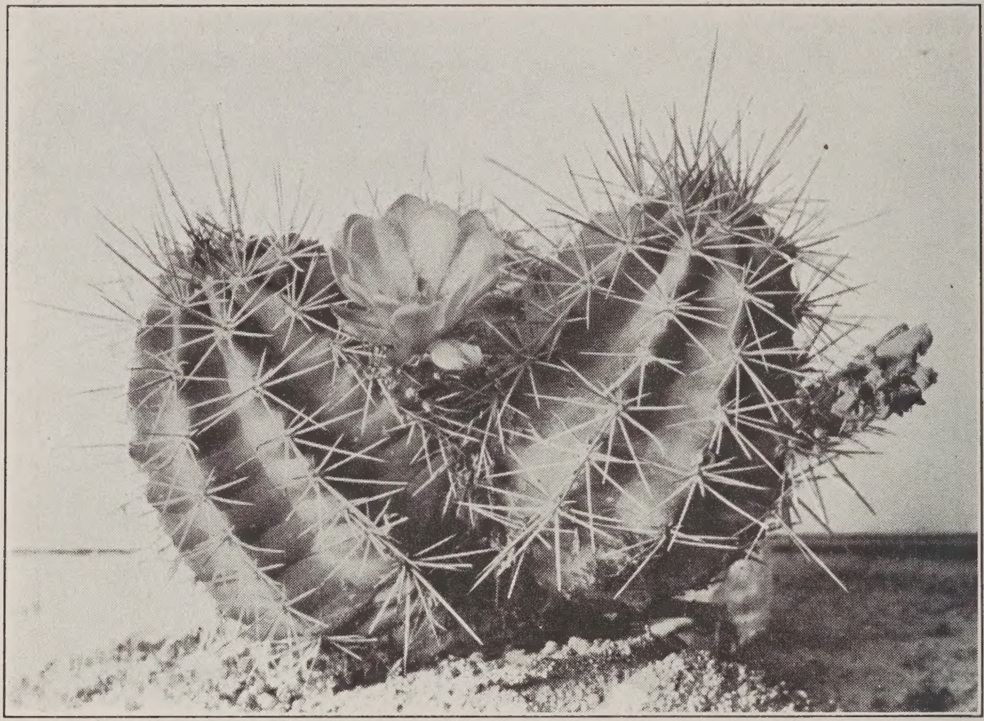
Shorter, dark green in color, with comparatively few spines and of form so characteristic that it is easy of identification when once seen, but with a blossom which vies with all these others, is the Ec. fendleri. Its purple flowers, erect and large, are handsome.

Similar in size, more conical in shape, and with a blossom which differs markedly from the others we have



ECHINOCEREUS FENDLERI

described, in shape, color and texture, is the Ec. conoideus. It has a comparatively small, close flower, red in color; in place of the silky texture which makes the others seem so brilliant it has a velvety look. The whole flower appears artificial.

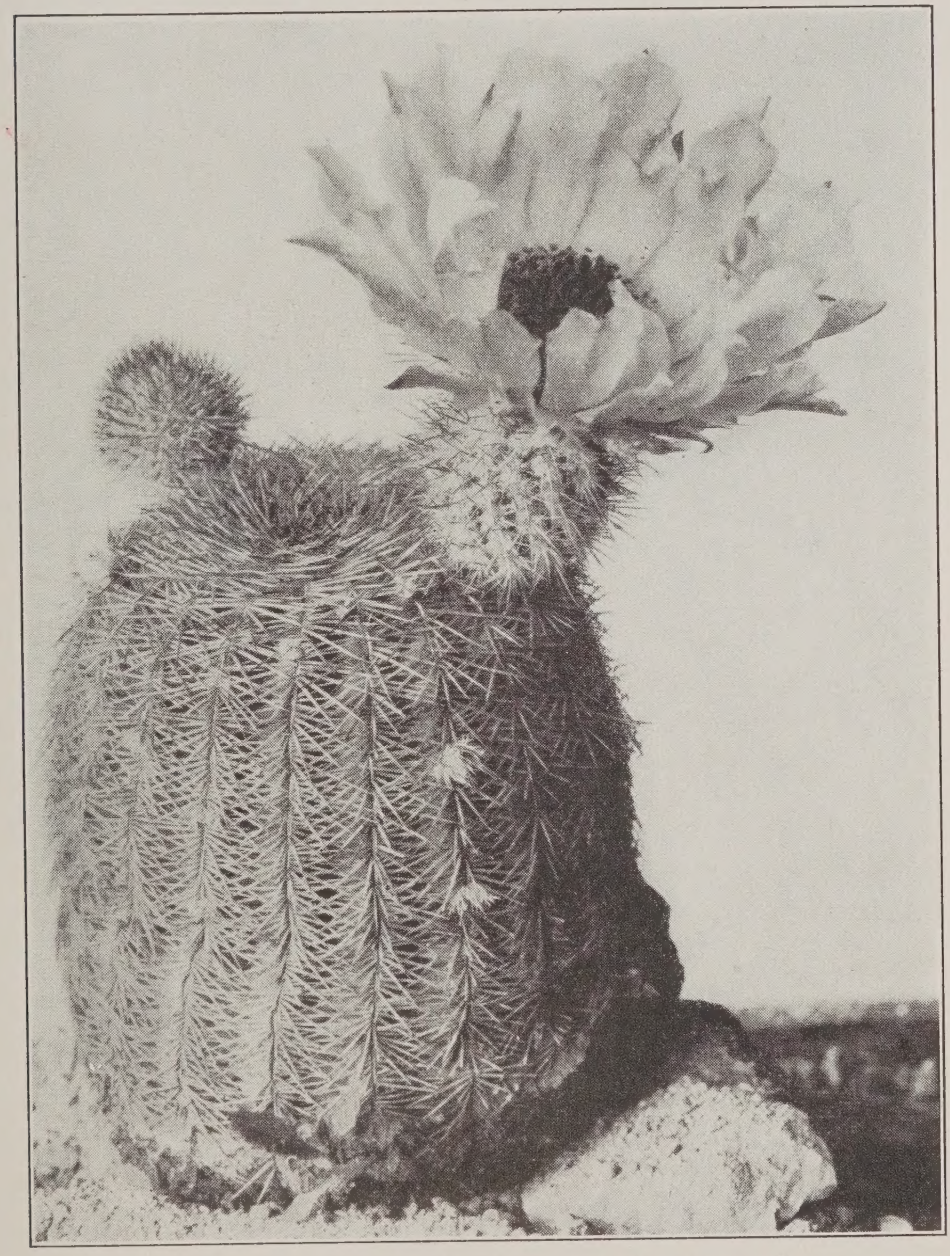


ECHINOCEREUS CONOIDEUS
A velvety red flower, not of the same texture as most of this group

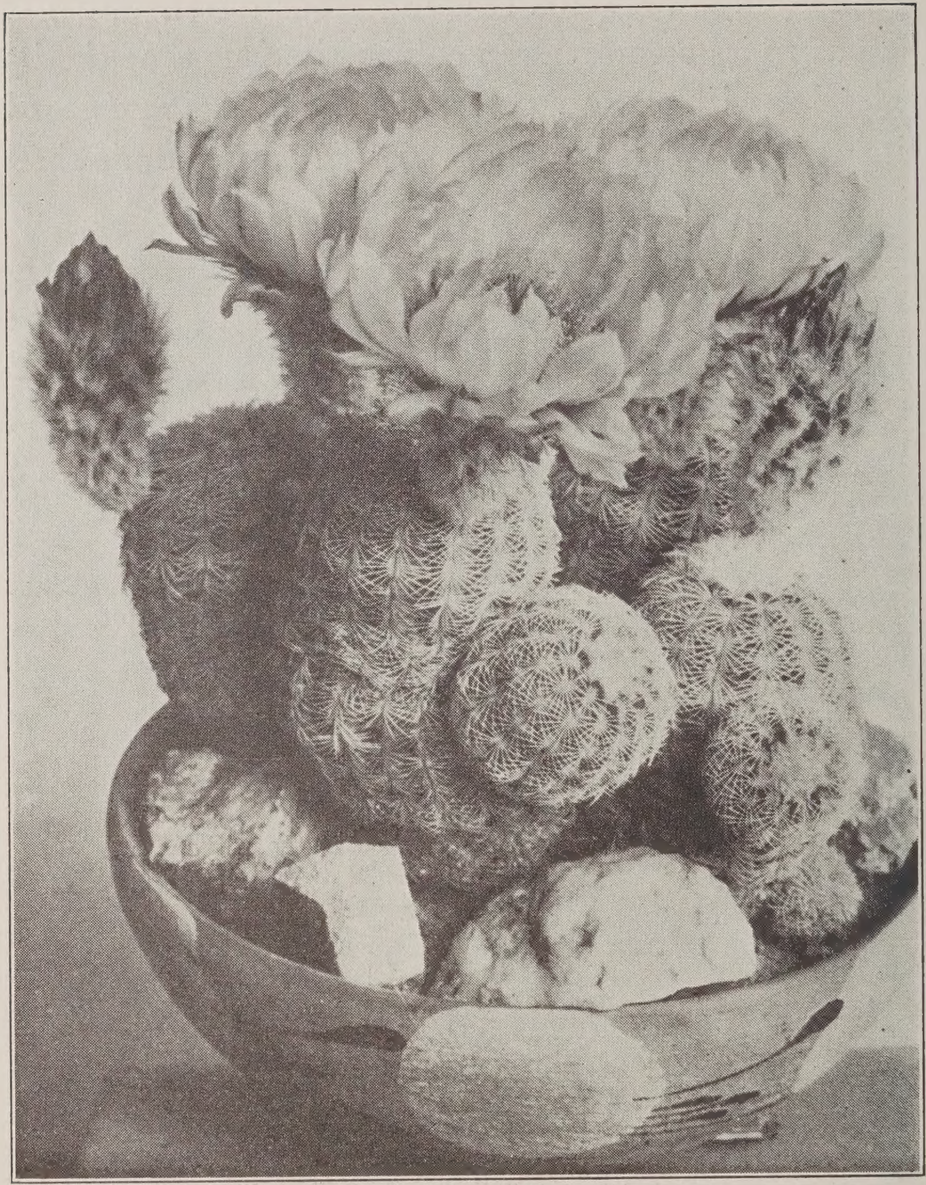
I have studiously avoided the use of technical terms in plant structure as cumbersome and unnecessary. The reader with scientific bent can easily verify from data given by use of reference books. But just here attention is called to the spine arrangement which is found on a group of Echinocereus, and to its name, pectinate which means comblike. The spines are set like the teeth in a comb and give a body of the Cactus a particularly neat, dapper appearance, quite at variance with some of the other forms, where the spines, though arranged in accordance with a regular plan, seem to run riot.

The Cacti of this group are generally quite small, but in blossoming are profuse in the wealth of bloom, and are noted for the color and size of flower.

The Rainbow Cactus (Echinocereus rigidissimus) is so called as to its common name from the fact that the body is encircled with rings of color, from the varying coloration of its spines. Its botanical specific name undoubtedly



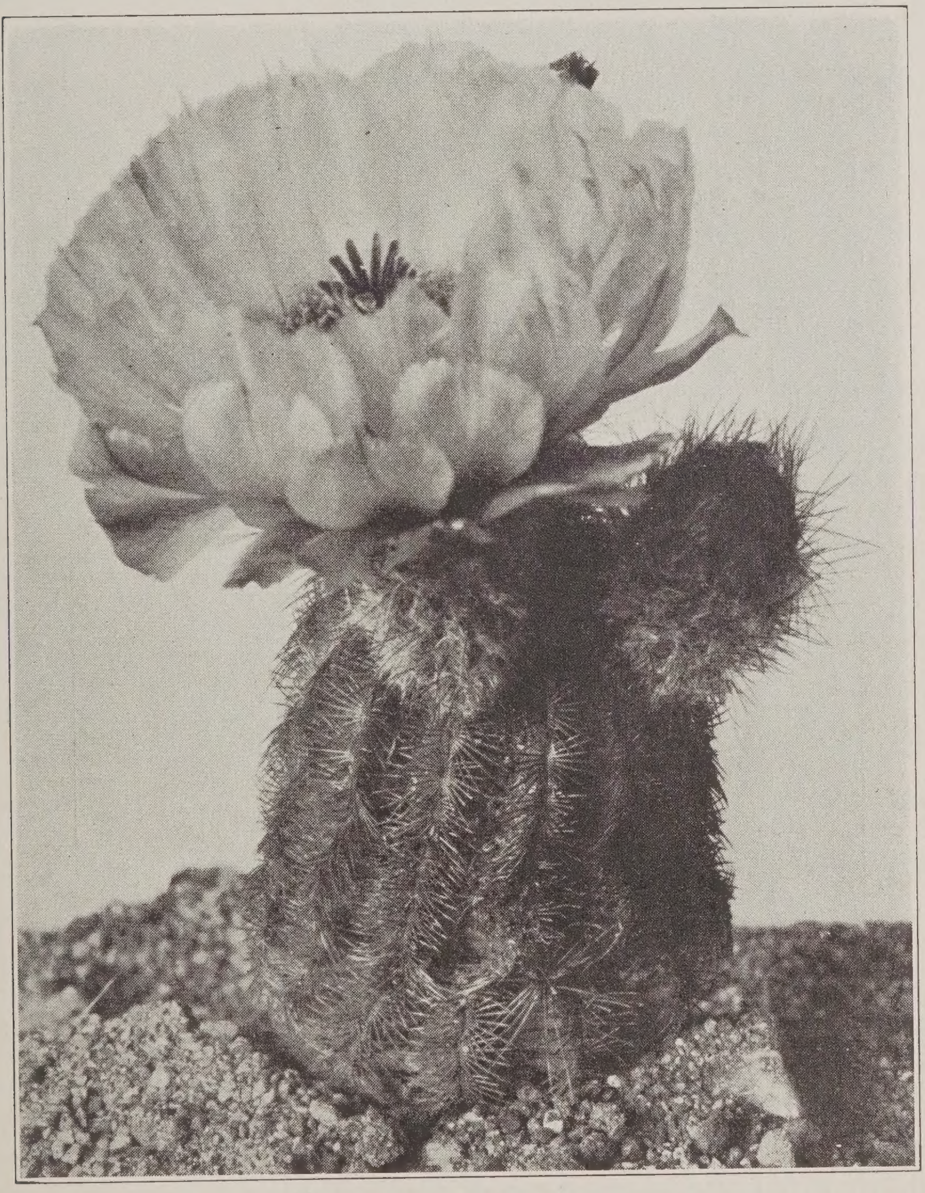
ECHINOCEREUS RIGIDISSIMUS (Rainbow Cactus)



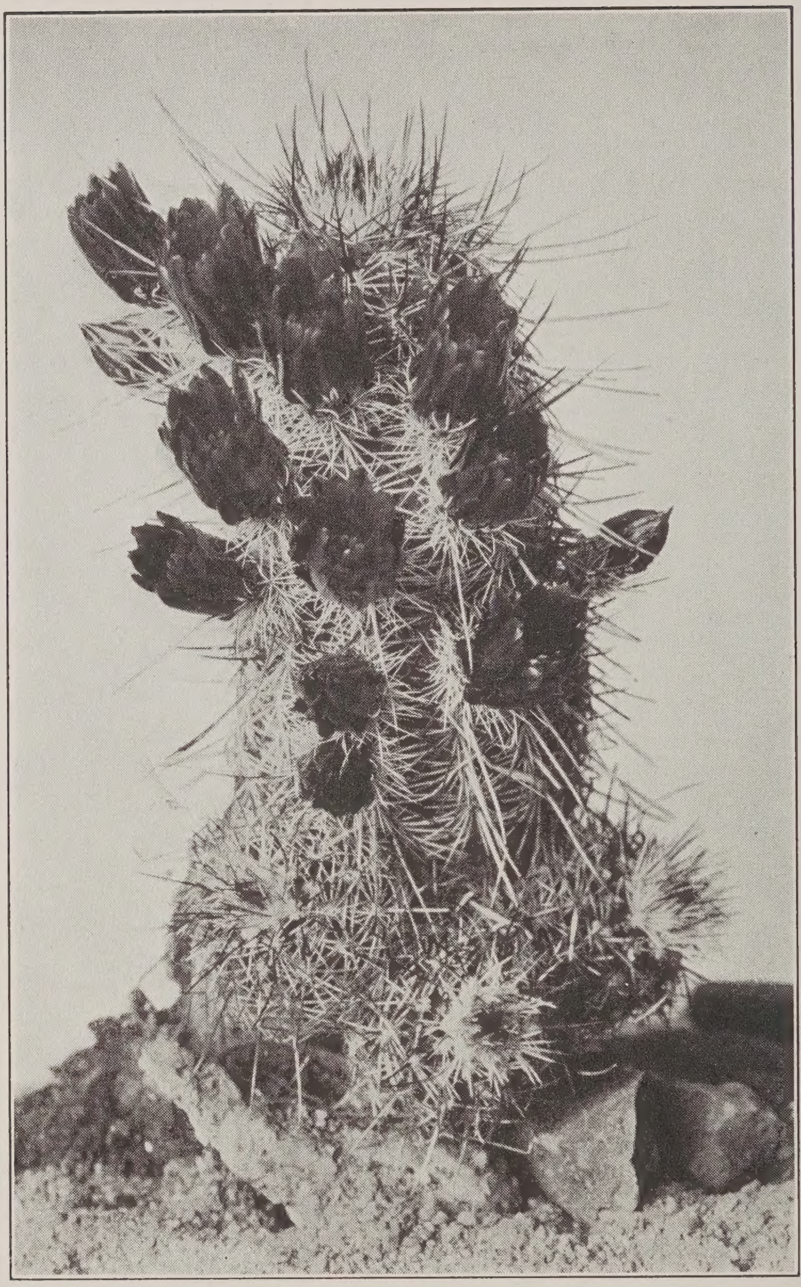
ECHINOCEREUS REICHENBACHI (Syn. Ec. caespitosus)
A window plant

refers to the stiff appearance given by its spine arrangement. Its flowers are a most beautiful clear pink, shading into a creamy yellow with a tinge of green toward the center. The characteristic stigma lobes of clear green just set it off and give it a particularly clean, fresh, clear look.

The Ec. reichenbachi (Syn. Ec. caespitosus), another of this group with white spines, has a pretty lacy appearance. (See illustrations on opposite page and facing page 8.) Its former name, by which it is still widely known,



ECHINOCEREUS PECTINATUS



ECHINOCEREUS CHLORANTHUS

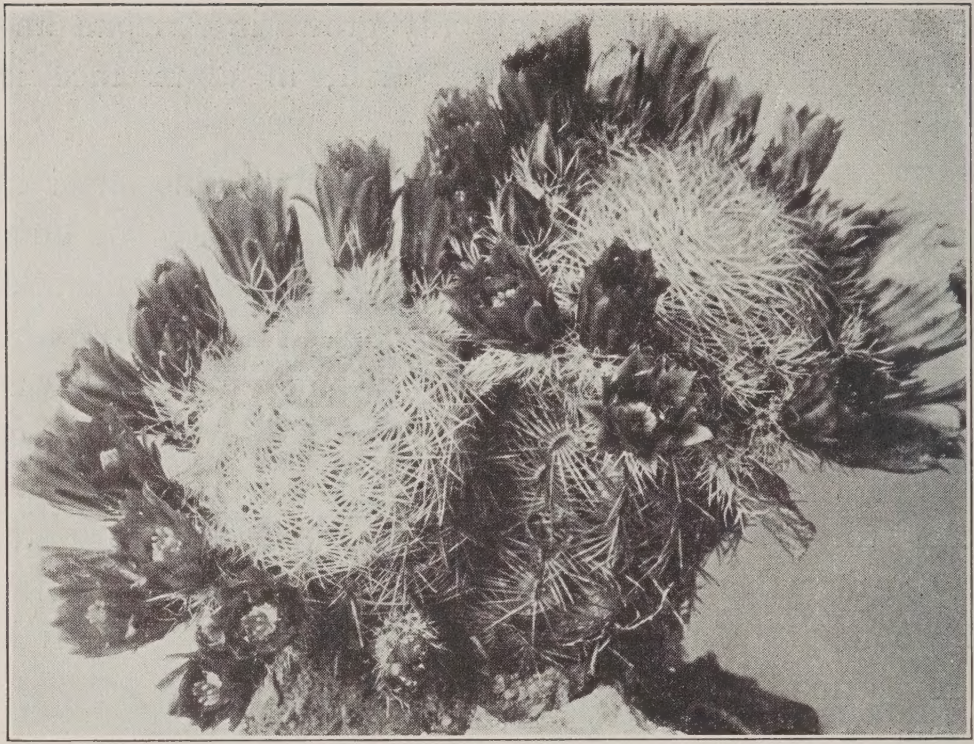
alludes to the fact that several heads come from the same stalk. The plant is small and one with several heads will not crowd a small bowl; it blossoms profusely and, in cultivation, may well be a choice where but one or two can be had. It not only grows in Arizona and Texas but is found further North, in abundance in Colorado.

The Echinocereus pectinatus resembles this latter in many ways but its spines are a reddish brown. The buds come out in gray knobs, like a little ball of gray chenille, and suddenly the little gray ball opens to disclose the lovely pink flower. It is a hard question to answer which is more fascinating—to watch the development of buds and flowers in their native habitat bringing life and color to their monotonous surroundings, or to note, day by day, the development of a specimen in our window. It would probably depend upon the individual; either is a revelation.

There are two Echinocereus with green blossoms from which fact come their names, chloranthus and viridiflorus.

The latter, Ec. viridiflorus (Engelmann), is of wider distribution than many others and extends farther North, into Wyoming. They are quite common, but being small plants they hide themselves. They are very pretty with reddish spines or white, sometimes variegated and often banded. Their flowers, chocolate and green, never do seem to quite open; the Ec. chloranthus (Engelmann) Rümpler, is a Texas specimen and its flowers are a lighter green. It is not so attractive as its sister.

A Texas beauty when in flower (for it is rather insignificant in appearance otherwise), is the Ec. berlandieri, with a slender dark green stem; it is quite different in appearance from others of the Echinocereus and bears an immense purple flower.



ECHINOCEREUS VIRIDIFLORUS

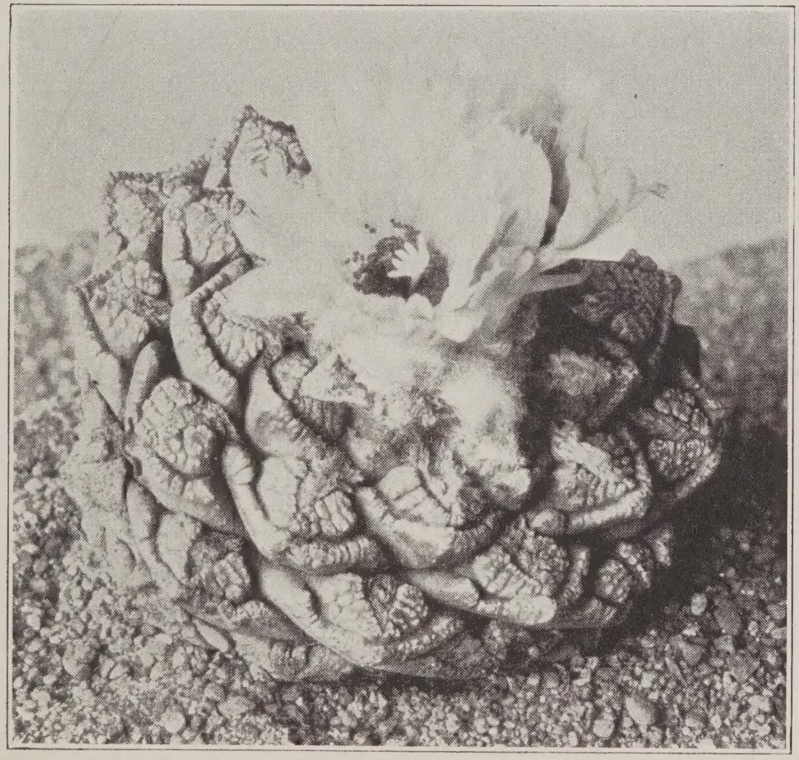
Many species are found below the line which do not belong in our own country, but our native material is so rich and so varied that it affords a pretty complete study of the varying types, and is certain to provide surprise and gratification to the reader to whom a Cactus is a "Cactus."

The fruits of quite a number of the Echinocereus are edible.

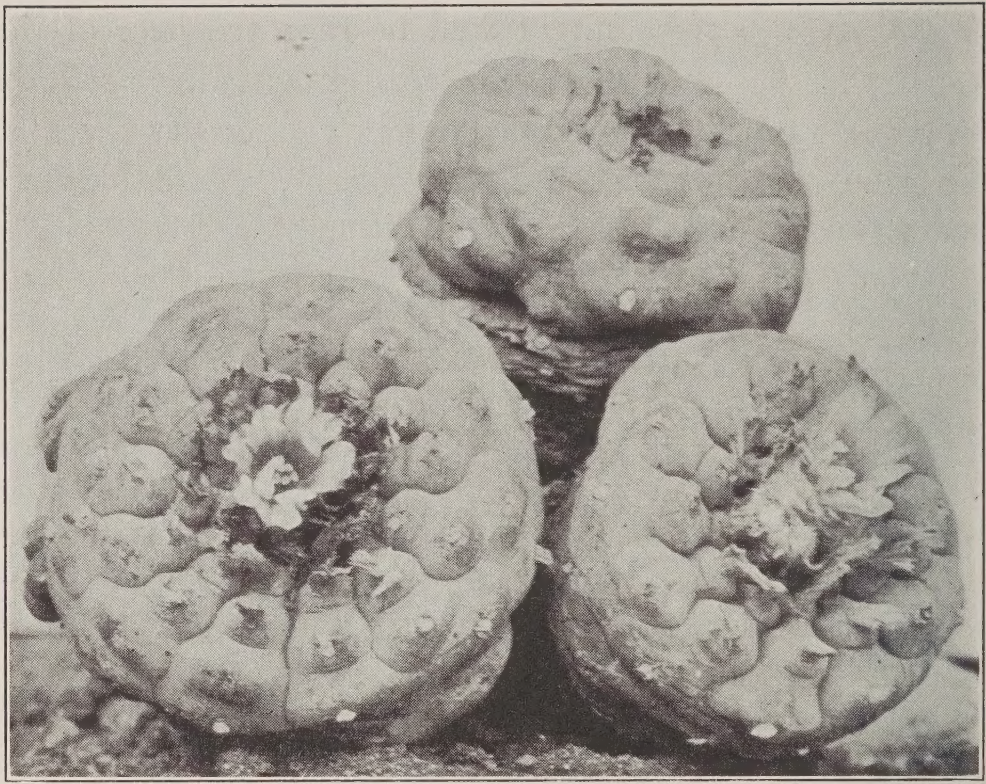
ECHINOCACTANAE

The Echinocactus or Hedgehog Cactus is comprised of a group including a large number of species running through many genera, found only in the Southwestern United States and Mexico. The last paragraph in regard to the Echinocereus might well be repeated here of the Echinocactus, for some very interesting ones keep strictly to the Southern side of the boundary line; yet those of our own country are many and varied. Most of them are strongly armed and included are Cacti of widely varying characteristics and equally wide interest.

Having started by saying that most of them are strongly armed, we will find that "the exception proves the rule," and that included are others that are entirely unarmed. The first of these is the Ariocarpus fissuratus or Living Rock, a Texas specimen. A grayish-green, dried looking plant, resembling fragments of crackled stone, it sometimes seems that "living" is the part of its name



ARIOCARPUS FISSURATUS (Living Rock)



LOPHOPHORA WILLIAMSI (Mescal Button. Peyote. The Divine Intoxicant)

that is a misnomer; but at another season, it changes in color, becomes fresher in appearance as the little bunch of dirty white wool at the top parts for the coming of the dainty little pink flowers which prove its right to the name.

The Lophophora (L. williamsi) is one of the most interesting plants in many ways which we encounter. Small plants, bluish-green, and known from their size and form as the Dumpling Cactus, its apparent insignificance is by no means a measure for the interest it holds, for it is that little plant which has been the subject of investigation for many years from widely differing angles. It is the plant known as the Peyote, Pellote, Mescal

Button and Sacred Mushroom, used by the Indians in some interesting religious rites because of its narcotic properties. Reported as early as the sixteenth century, in an account of the Aztec ceremonial feast of Teonanacatl, it was then thought to be a species of fungus, only the dried sections being seen, whence comes the name of Sacred Mushroom. Its botanical names have also been varied, it having been known variously as Echinocactus, Mammillaria, and Anhalonium, each accompanied by the specific name "williamsi" and "lewini," the latter from the name of the scientist who isolated the alkaloid anhalonine. Another drug is also found in in the plant which is the source of narcotic properties. The plants as used by the Indians in their sacred rites are sliced and dried, these dried bits being the Mescal Button, so called. This ceremonial has been the subject of investigation on the part of the U. S. Government through the Bureau of Ethnology, and a report gives a full description of the use of the narcotic.*

The use of the Peyote spread from the Southern tribes to the North, and was in quite general use. Edna Ferber in one of her stories, *Cimarron*, gives a description of the use of this drug by the Indians of Oklahoma. In the *Atlantic Monthly* of November, 1929, under the title "A Divine Intoxicant" is described the interesting experiments conducted by Dr. Weir Mitchell and others on the effects of this narcotic, which are said to be the seeing of visions and, particularly, the vision of color, intense and luminous. This proved itself in the experiments so reported. The effect as there described was of the vision of the most vivid colors, kaleidoscopic in character,

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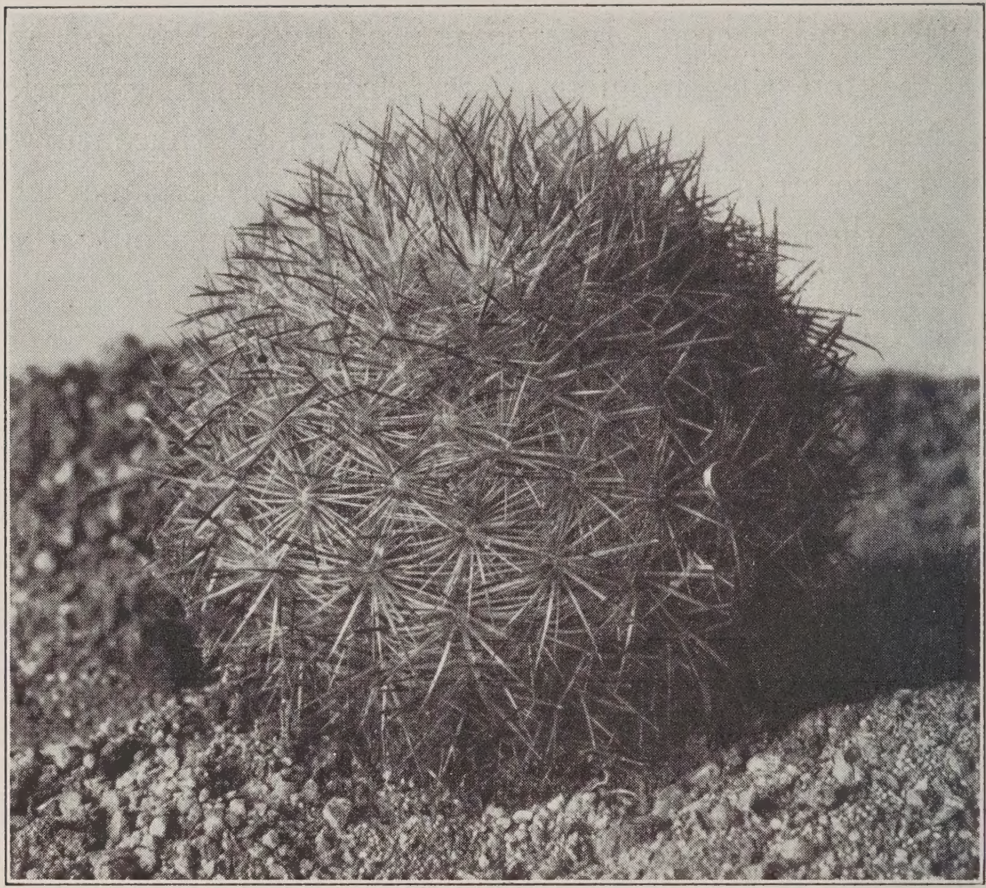
*33rd Annual Report, Bureau of American Ethnology, *Uses of Plants by Indians*, Melvin Randolph Gilmore. Description of religious ceremonies connected with use of Peyote.



Pediocactus simpsoni

and was said to have had as an after result a subsequent deeper appreciation of color.

The traffic in this Cactus among the Indians has been forbidden by certain states, but is said still to persist. This is another of the group that is entirely unarmed, the areole having simply a tiny bunch of hair. It is said that animals will not touch the plant, succulent and defenseless as it is, because of its acrid and poisonous juice. It has a small pink flower, almost white.

The Pediocactus simpsoni (called by Engelmann the Echinocactus simpsoni) is known as the Plains Cactus and has a wide distribution, being found from Kansas to New Mexico, in Nevada, Washington, Idaho, Montana and Colorado. It is a pretty little Cactus, with dainty pink flowers, although it is at times found growing in grotesque forms. It also is practically unarmed, for its spines are very inoffensive.

EPITHELANTHA MICROMERIS showing small red fruits

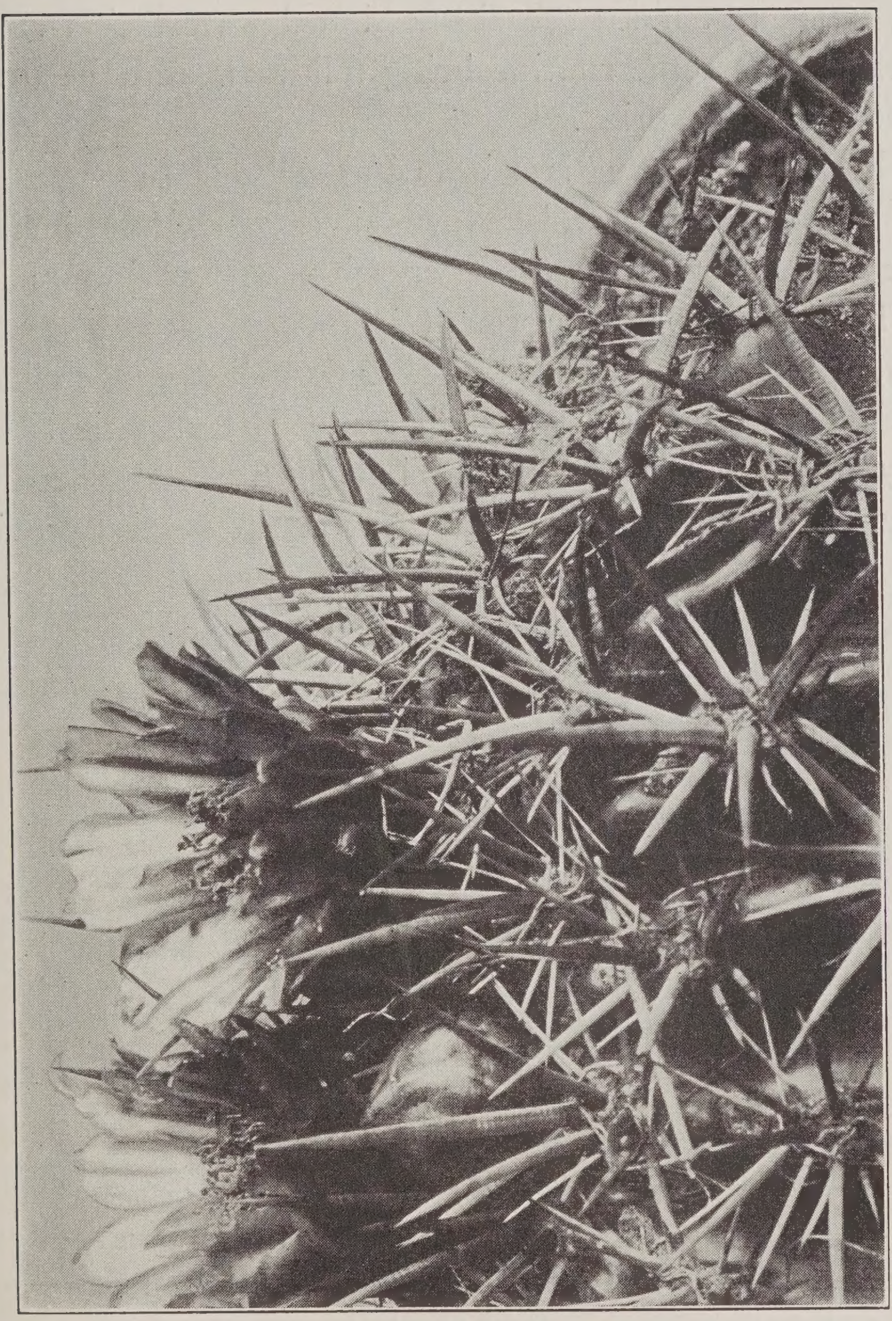
The Epithelantha micromeris is illustrated most beautifully in Engelmann's botanical works. In one of the wonderful steel engravings that book contains which must always excite our admiration, Engelmann calls it Mammillaria micromeris. It is known as the Button Cactus, and is a tiny, lacy little thing, having insignificant little flowers, so tiny that they are scarcely noticed; but presently there appear, one by one, as if by magic, the loveliest little scarlet fruits, "chillitos," which are long persistent, their jewel-like form standing out against the lacy white spines.

There is a wide departure between this tiny little one and the Ferocactus, where are found some of the giants of the Cactus family, the famous Visnaga (Bisnaga) or Barrel Cactus of the deserts! Many of them, like the beautiful F. grusoni with its golden spines, and the F. ingens, from whose spines the Cactus toothpicks of the Mexican curio stores are made, keep strictly to the Southern Republic whose wealth of Cacti is so abundant. But our Southwestern deserts have them in varying form, the F. wislizeni of Texas, New Mexico and Arizona running into and becoming confused with the F. lecontei in California and the F. acanthodes (familiar as the Echinocactus cylindraceus of Engelmann) of the Colorado desert of California. We can no longer say unarmed; fero (fierce), is no misnomer!

The Visnagas, immense as they are, have a comparatively small tap root, and very inadequately anchor themselves in the stony soil, so that it is no uncommon sight to see them uprooted, lying about, the base black with decay, and the top as beautiful and gay as ever. The spines are often pink or red, sometimes white or yellow, and the appearance of these wayside derelicts is often that of huge bouquets lying among the rocks.

These Cacti, known as the wells of the desert, contain a supply of palatable drinking water available to the desert traveler. They have saved many a life, and might have proved the salvation of many a thirst-mad man, who has perished in the heat of the desert, had he known of this wonderful source of supply. To obtain the fluid the mode of procedure is as follows: The top of the Cactus is cut or knocked off, and the flesh is mashed, with a resulting palatable drink, the amount obtained in this manner being as much as two to three quarts. This method is graphically illustrated in the prints accompanying the article by F. R. Colville, entitled *Desert Plants as a Source of Drinking Water.*

The body of this Cactus is used by the Indians as a cooking utensil; the flesh is hollowed out and the cavity filled with hot stones upon which is placed the food to be cooked. It was the aboriginal interpretation of the fireless cooker.

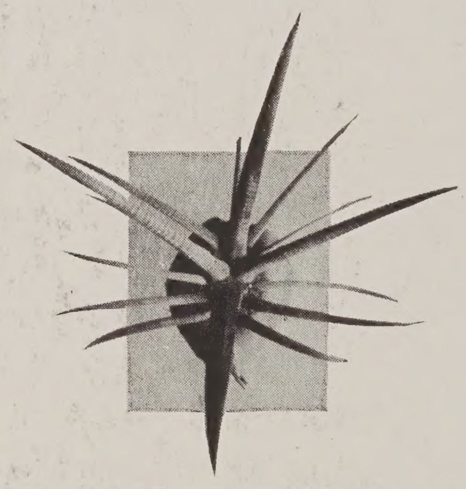


FEROCACTUS VIRIDESCENS (Echinocactus viridescens)

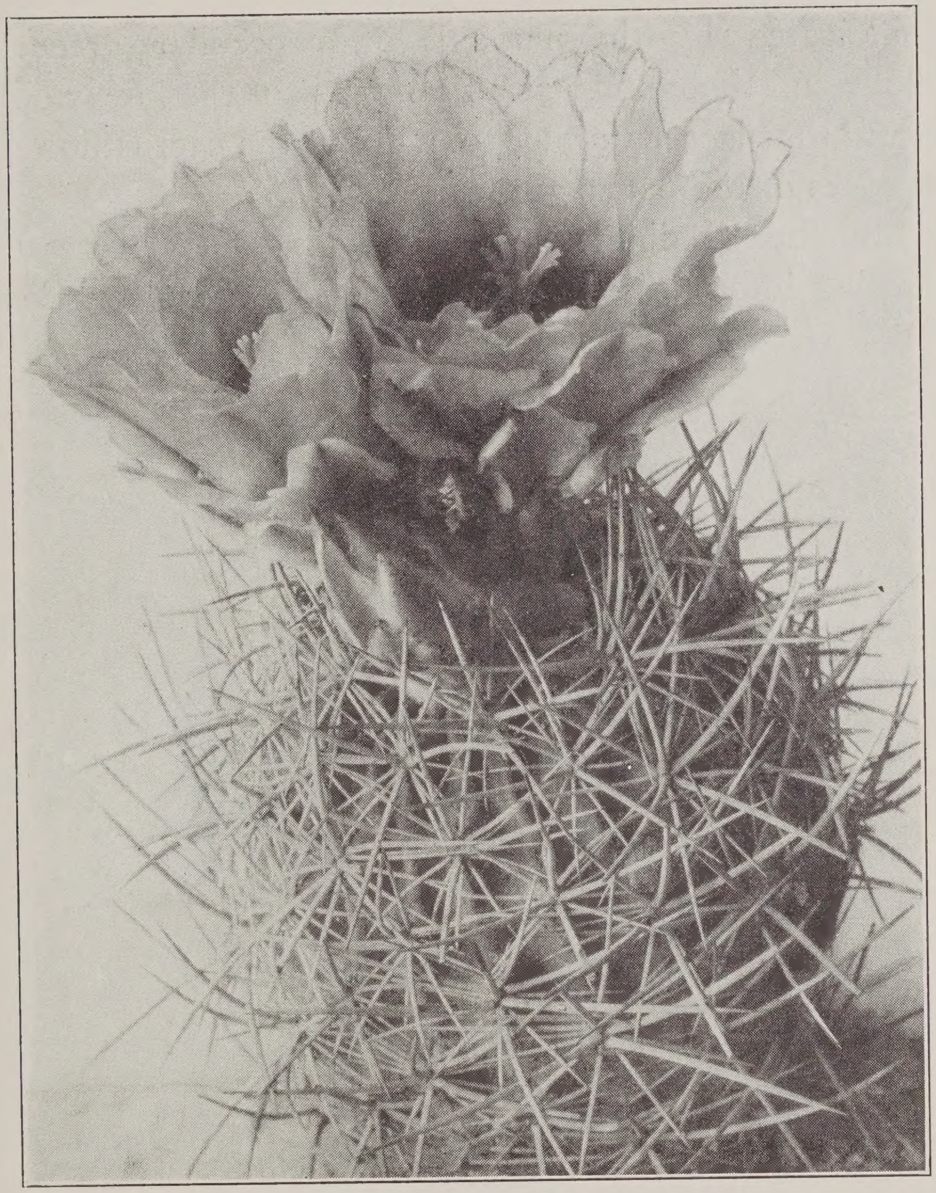
It is from the Bisnaga that cactus candy is made—this after the Indian and Mexican method which, however, much resembles the old-fashioned watermelon rind preserves, the same routine being followed, and the preserved bits being dried.

The Barrel Cactus is a beautiful sight in the Spring, with the white, pink and yellow spines curved and intertwined, and around the top a wreath of yellow flowers.

The Ferocactus viridescens (Echinocactus viridescens, *Nutt*), found only on the Coast near San Diego, extending into Lower California, is a smaller and flatter species. It rarely grows over 10 to 12 inches in height. The spines do not cover the body of the Cactus as in the species previously described, but they are very distinctive. When they first appear they are of a beautiful ruby red, later turning to pink and ivory, and finally, in age, becoming dark and dull. They are marked by transverse lines or rings (annular) and look as if carved. Growing close to the ground as they do, they are not readily noticed unless



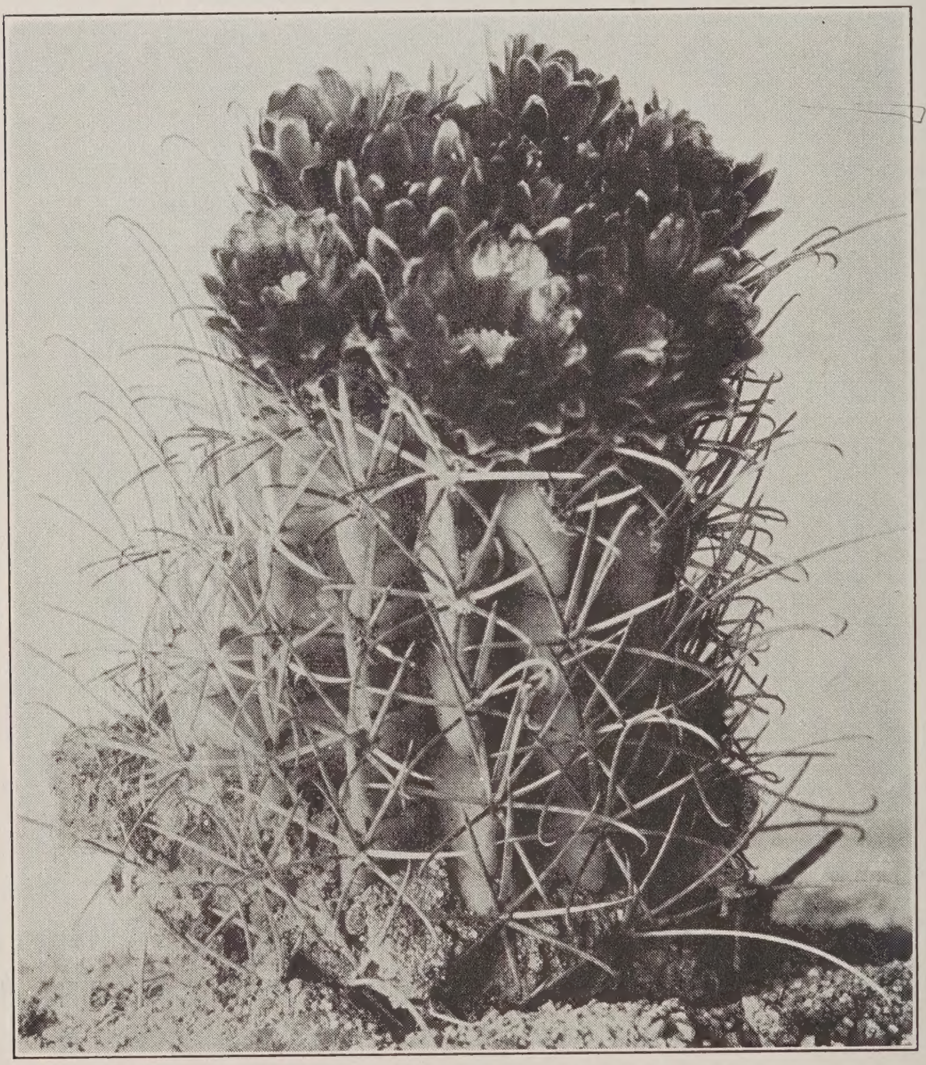
SPINES FROM
FEROCACTUS VIRIDESCENS



FEROCACTUS JOHNSONI

one is on guard and looking for them. Their spines are like steel, and will penetrate the stoutest shoe if inadvertently stepped upon. A sound admonition to keep in mind when in the hills about San Diego, especially in the Spring, when the growing herbage somewhat hides them, would be "watch your step!" The blossom of this species, as indicated by the name is of a peculiar greenish-yellow, and though not at all showy, is of the lovely silky texture that is a feature of so many of the cactus flowers; the edges of the petals are fringed.

Mrs. Lee (Indian Arts League, San Diego) gives the following information: "The seed of the small or Coast



FEROCACTUS UNCINATUS WRIGHTI
Flowers of a most peculiar reddish-chocolate color, and on the outside the sepals outlined with white

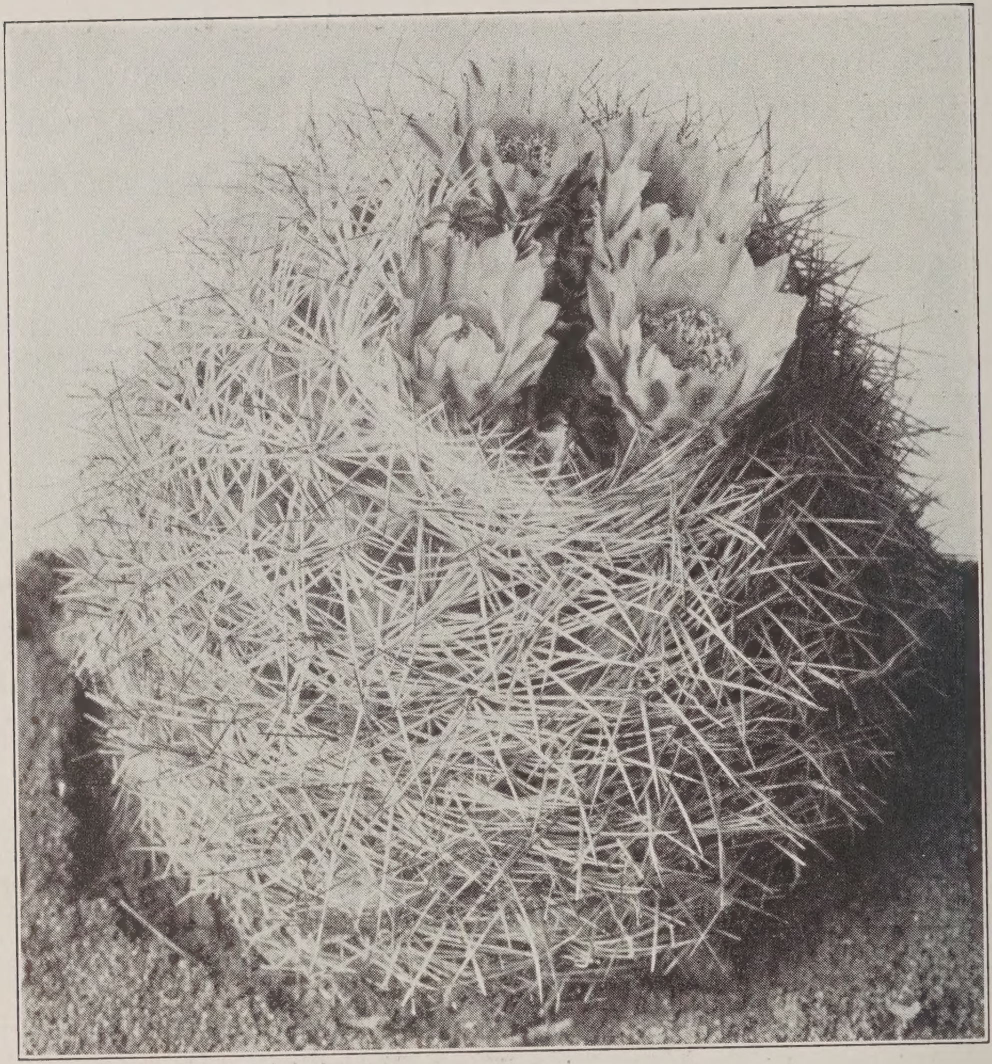
Bisnaga (F. viridescens) are rubbed in the hands to free them from pulp; then slightly parched and ground in the matate, placed in a bowl and water added. The ground seed is quite oily and the resulting mixture, when beaten, is like a thin mush or thick gravy in consistency. This is eaten or drunk and is quite refreshing."

The Ferocactus johnsoni is a California species, running into Utah. It is a small plant with large, beautiful blossoms.

The Ferocactus uncinatus, a small member of this genus, is most interesting in appearance. With its long spines of pink and yellow, the yellow ones hooked, and its clustered flowers of a most unusual color in any plant, it is sure to attract attention. The flowers are—for want of a more fitting word—a dark maroon, and the perianth segments have a white marginal line on the outside. This is of suitable size for a pot plant and would prove of interest in any collection. Although care should be taken to insure perfect drainage, in the cultivation of any Cacti, that care should have extra emphasis with this one.

The Echinomastus intertextus (Echinocactus intertextus, *Engelmann*) is a small plant, its flowers clustered at the top, surrounded by a little nestlike growth, sheltering the delicate blossoms with their yellow stamens and coral pink stigma lobes.

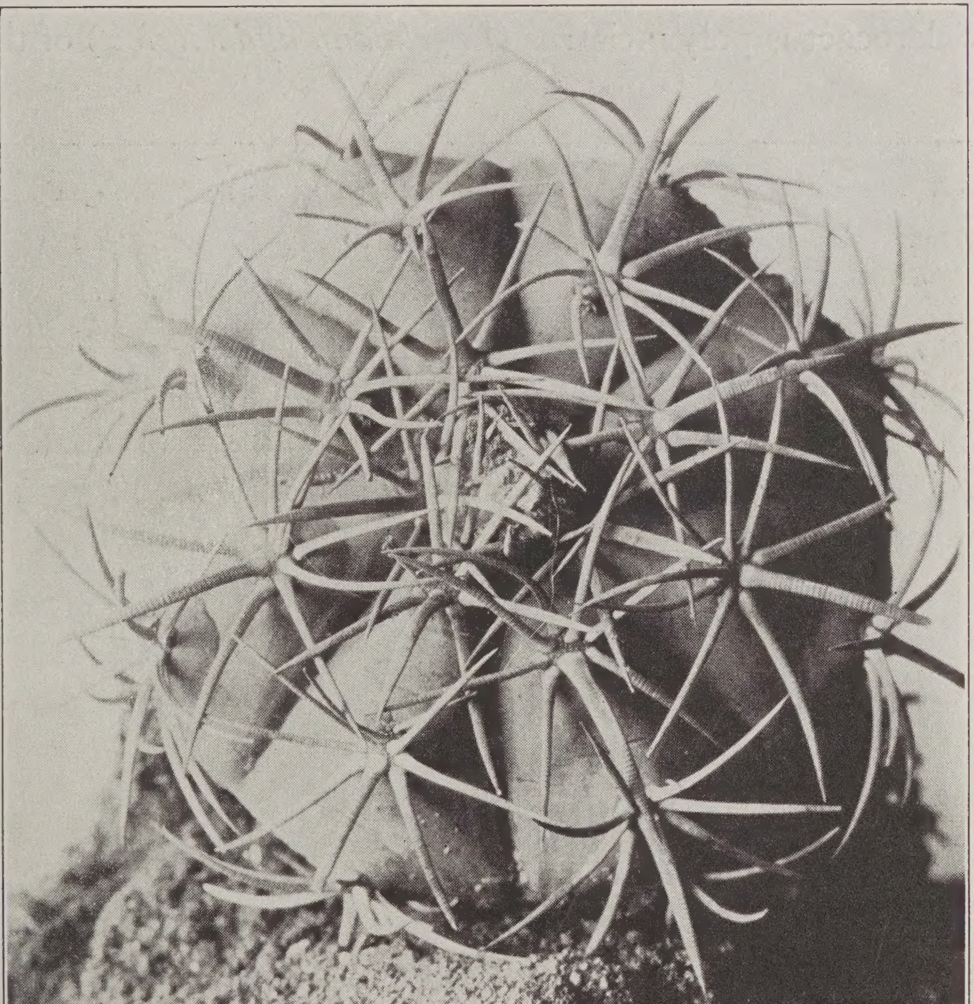
Echinocactus has two representatives. One is the E. polycephalus (*Engelmann and Bigelow*) of Western Arizona and California, that in California being found in the Mojave desert where it is known under the euphonious name of Niggerhead. The name is indicative of the manner of



Ferocactus intertextus

growth—many headed. They are found in clumps of from 10 to 60 heads, each 8 to 10 inches in diameter. The second is the Echinocactus horizonthalonius (*Lemaire*) of Arizona, New Mexico and Texas. It is known in some parts of the Southwest as Manco Caballo because horses stepping upon it become maimed. It is rather a flat growing plant and with its steel-like spines might easily inflict such injury. It is of rather a clear green and has bright pink flowers.

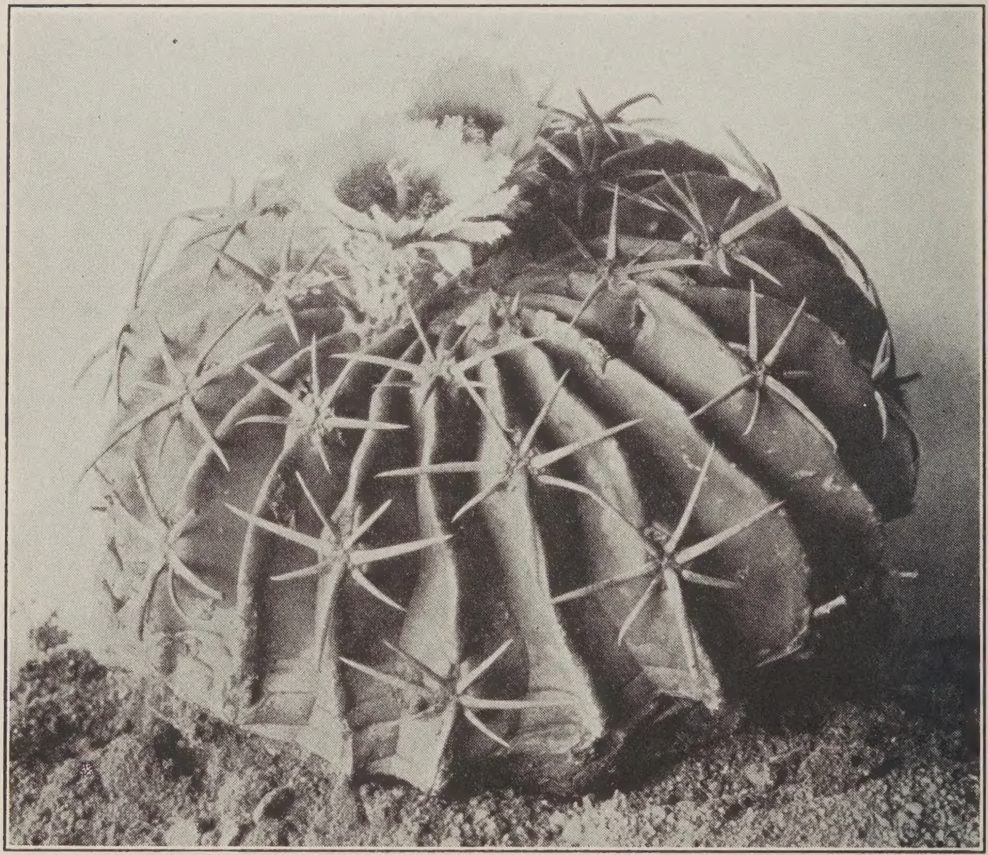
The Homalocephala texensis (Echinocactus texensis, *Hopffer*) has a common name which is certainly both descriptive and merited. It is called the Devil's Pincushion, and its stout steel spines are of quite sufficient menace to make this name no exaggerated misnomer. It would



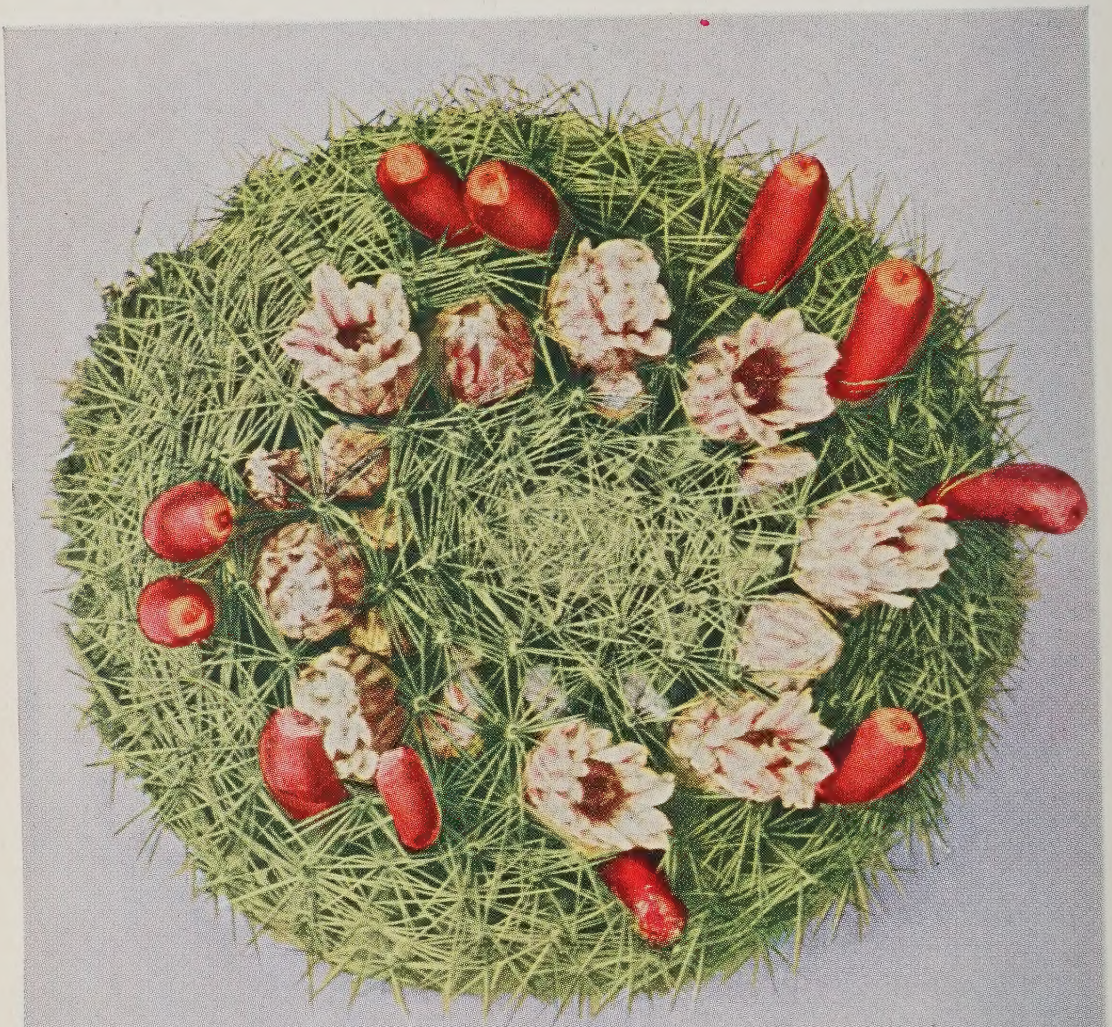
ECHINOCACTUS HORIZONTHALONIUS

almost seem that the more vicious the look of the individual and the more forbidding it seems, the more delicate the blossom. The flower of the Devil's Pincushion is the most delicate thing imaginable, its silky, fringed, light pink blossom being almost startling in contrast to its wicked spines and the dense repelling look of its gray-green body. It has a globular scarlet fruit which seems more in keeping with its color scheme and which is highly effective.

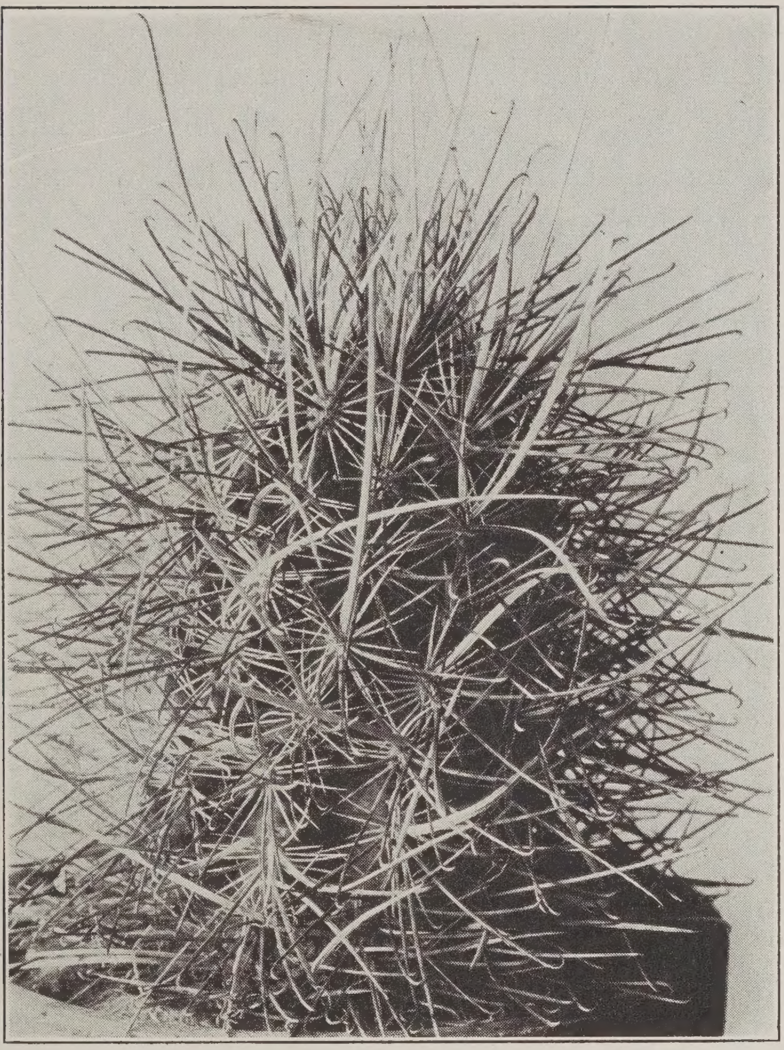
The Sclerocactus has two representatives also; the Sclerocactus polyancistrus (*Engelmann and Bigelow*) of the



HOMALOCEPHALA TEXENSIS
This has the most delicate, fringed, pale-pink flowers



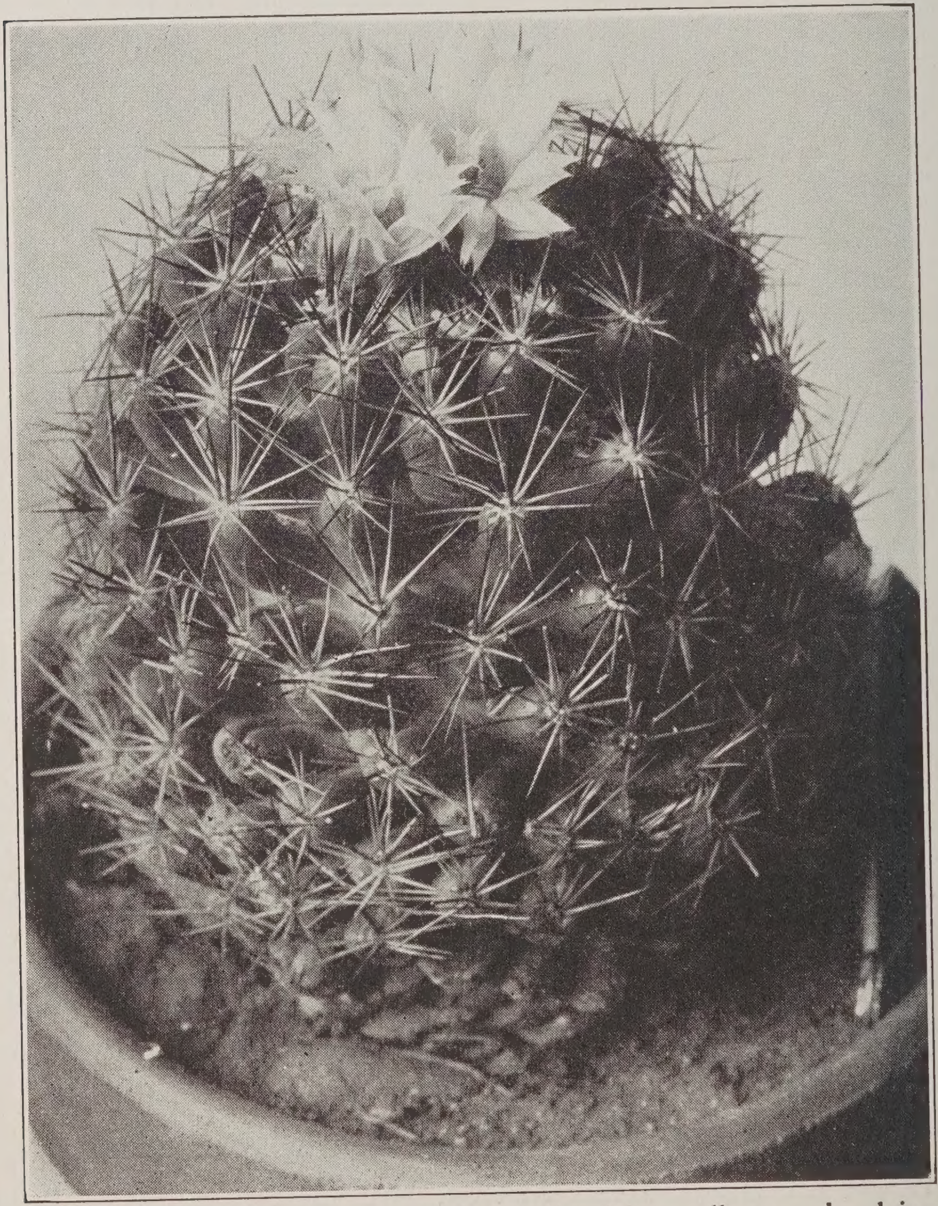
Neomammillaria applanata



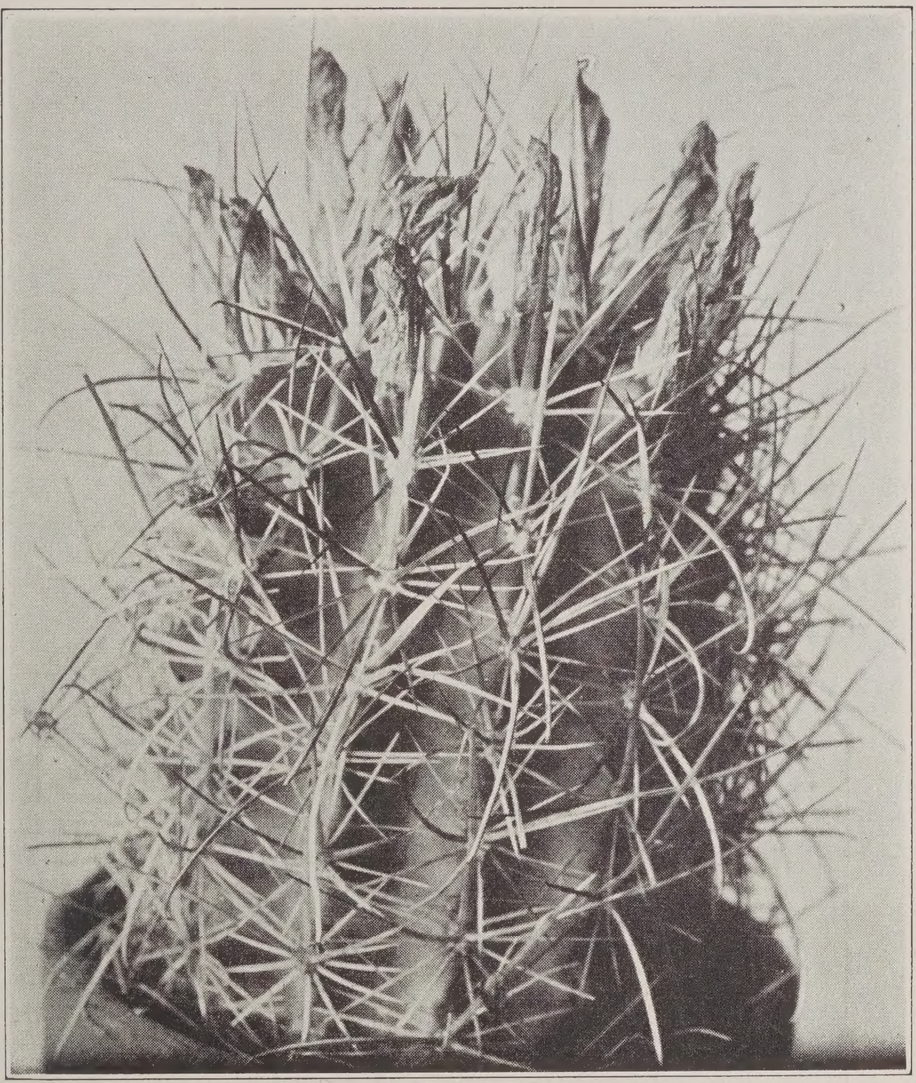
SCLEROCACTUS POLYANCISTRUS

Mojave desert, California, and East to Nevada; and the S. whipplei of Arizona. The former has a yellow flower and the latter, as described by Dr. Engelmann, a reddish-green one. The beauty of either species lies in its spine arrangement.

There remains one other representative of the Echicactanae in the United States, the Utahia sileri. This has been known only from a herbarium specimen. A claim is made by a San Diego man of its discovery growing in Southern Utah. This form closely answers the description, and will perhaps prove itself to be the long sought Cactus. In any event it is a handsome plant and an illustration thereof is here presented.



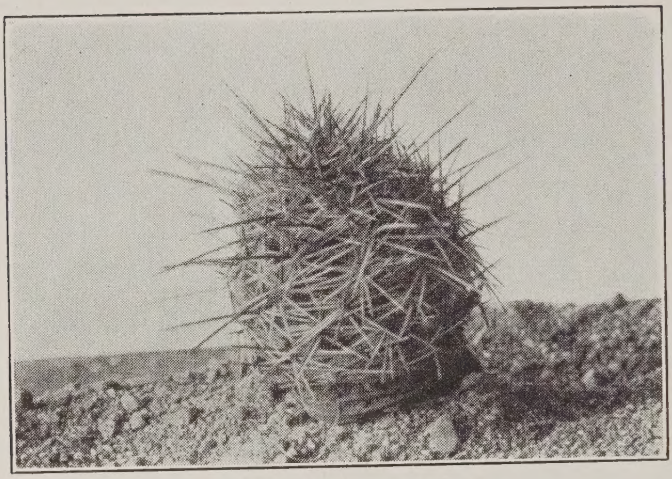
A handsome Cactus, found in Utah by a San Diego collector, who claims it to be the long lost Utahia sileri



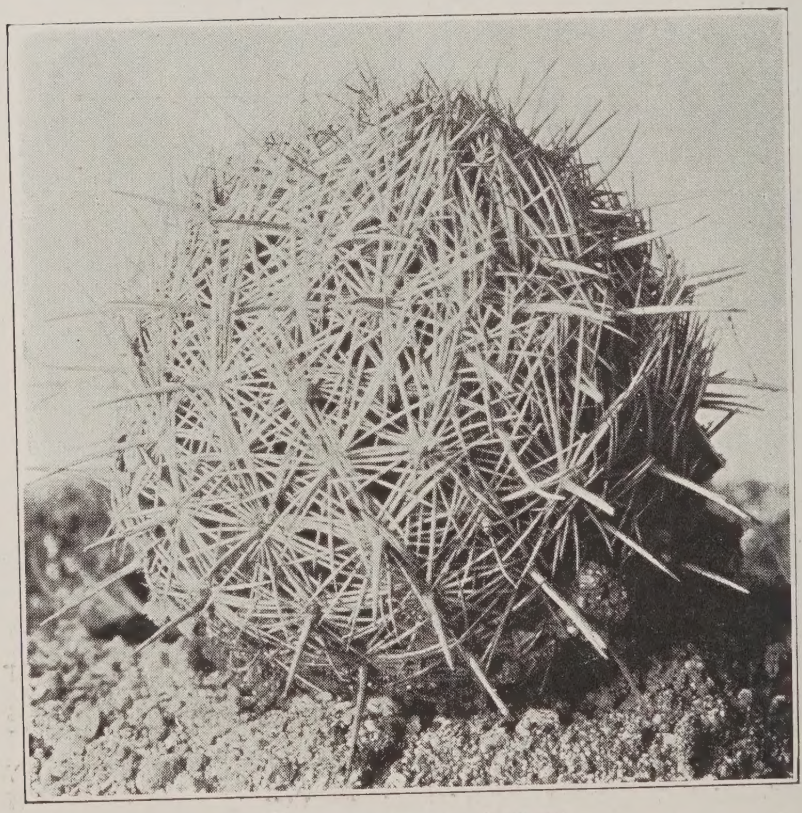
SCLEROCACTUS WHIPPLEI

CORYPHANTHANAE

Vying with the Echinocereus, a close second, or perhaps in the front line in the matter of interest, comes the Coryphanthanae, which includes most of those with which we are familiar as Mammillaria. Without the economic value that attaches to some of the Opuntias and some of



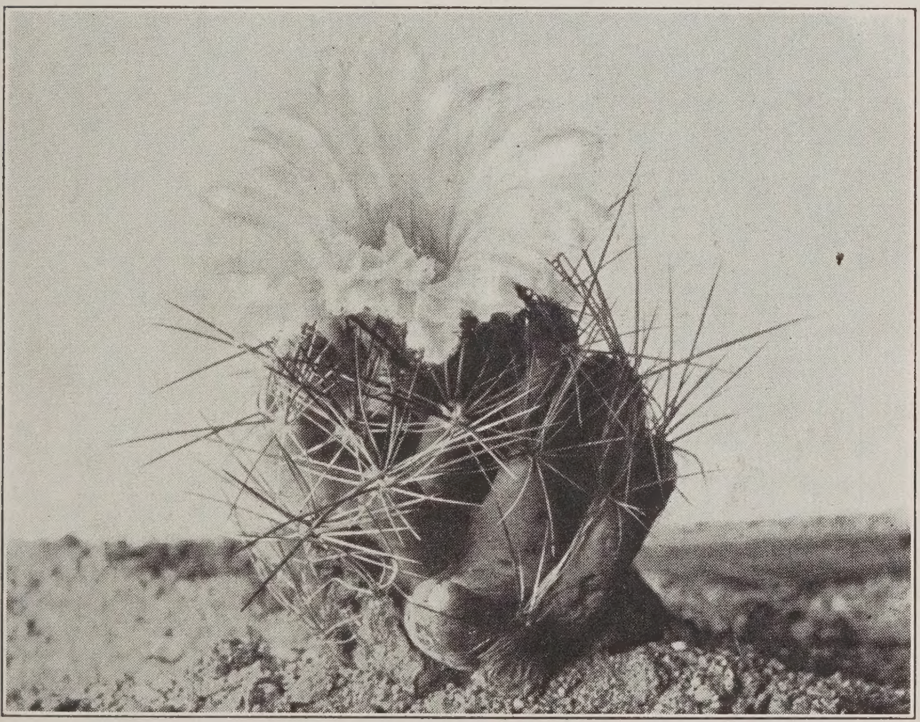
NEOLLOYDIA TEXENSIS



CORYPHANTHA ECHINUS

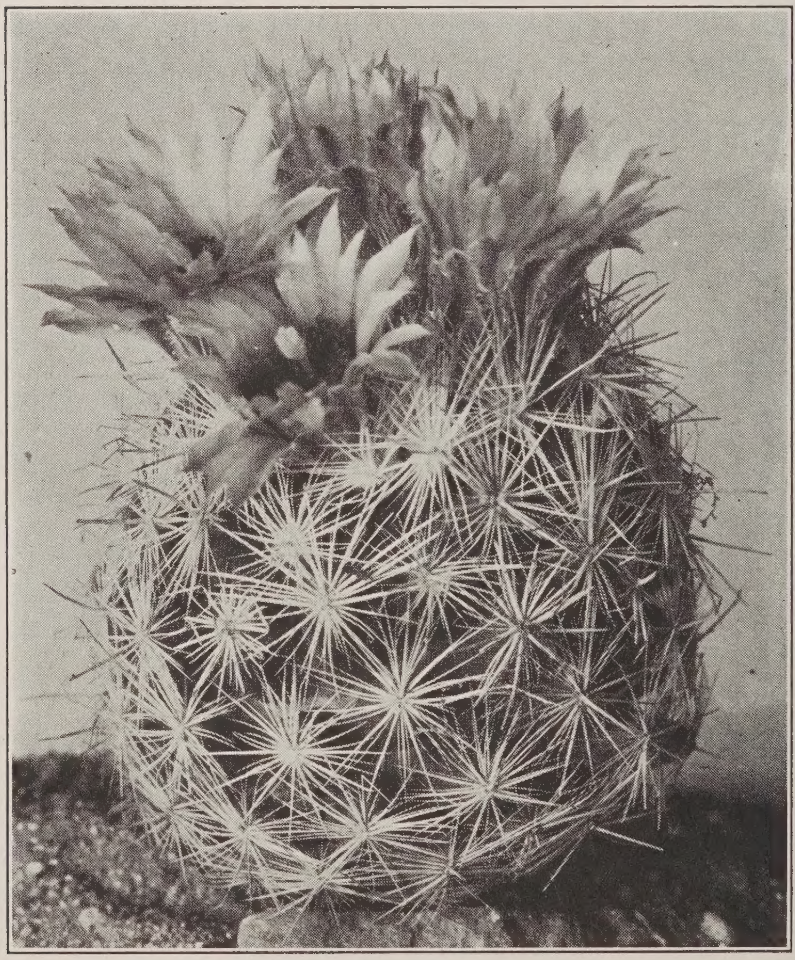
the Cerei, their chief mission seems to be to look pretty and interesting. If this is true, it must be acknowledged that right well do they fulfill their mission and take their allotted place.

It is perhaps unfortunate for us that so many of the interesting things in this group are Mexican, and that the very stringent (possibly justifiably so) regulations are such that they cannot come into our country to be so generally enjoyed as would be desirable. The laws that govern, not only their importation, but their sale after importation, militate against their general distribution, and keep the prices so high on those that are eventually permitted to be sold that they are practically prohibitive to people of limited means.



CORYPHANTHA MACROMERIS
Delicate pink flower

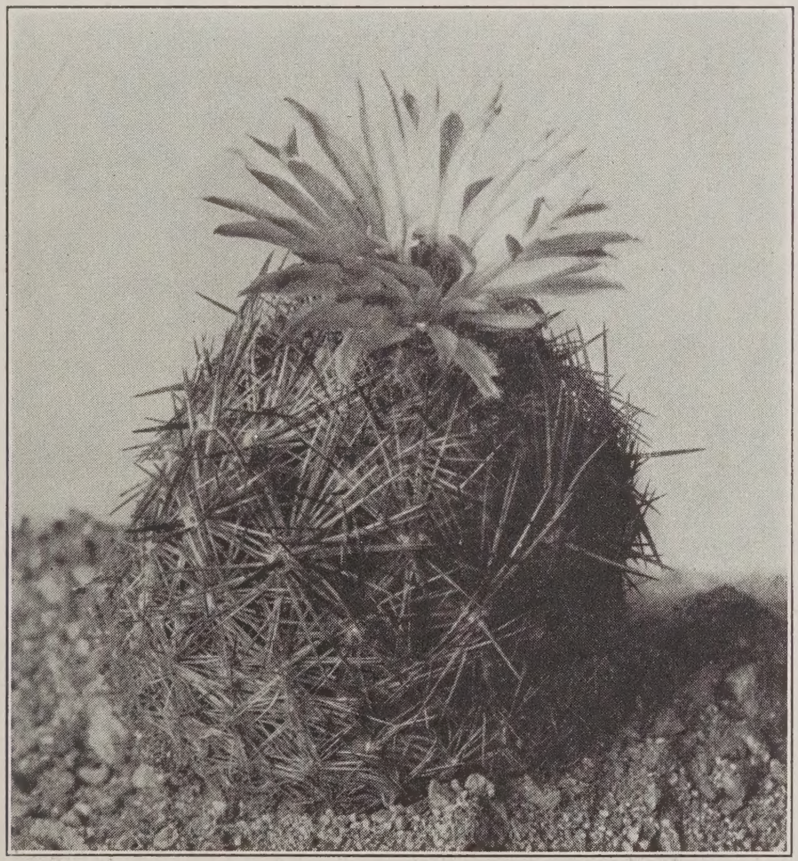
The name Fishhook Cactus has been altogether too commonly applied to any small Cactus with a hooked spine. Its use has been so indiscriminate an appellation that it has come to mean nothing; a Fishhook Cactus now means, in common parlance, any one of a large number of quite different species, and should not be used. Scientifically, however, the use of this term is justified in one case; namely, the Ancistrocactus (Fishhook Cactus) which finds two representatives in Southern Texas.



CORYPHANTHA RADIOSA

Thelocactus bicolor (*Galeotti*), the Nipple Cactus, is an unusually interesting little thing because of its spines; they are red and shining, but are accompanied by white, papery, flat ones, which rather set it aside as "something different." This might well be one of the small colony in our window garden. Its blossoms are a purple-pink.

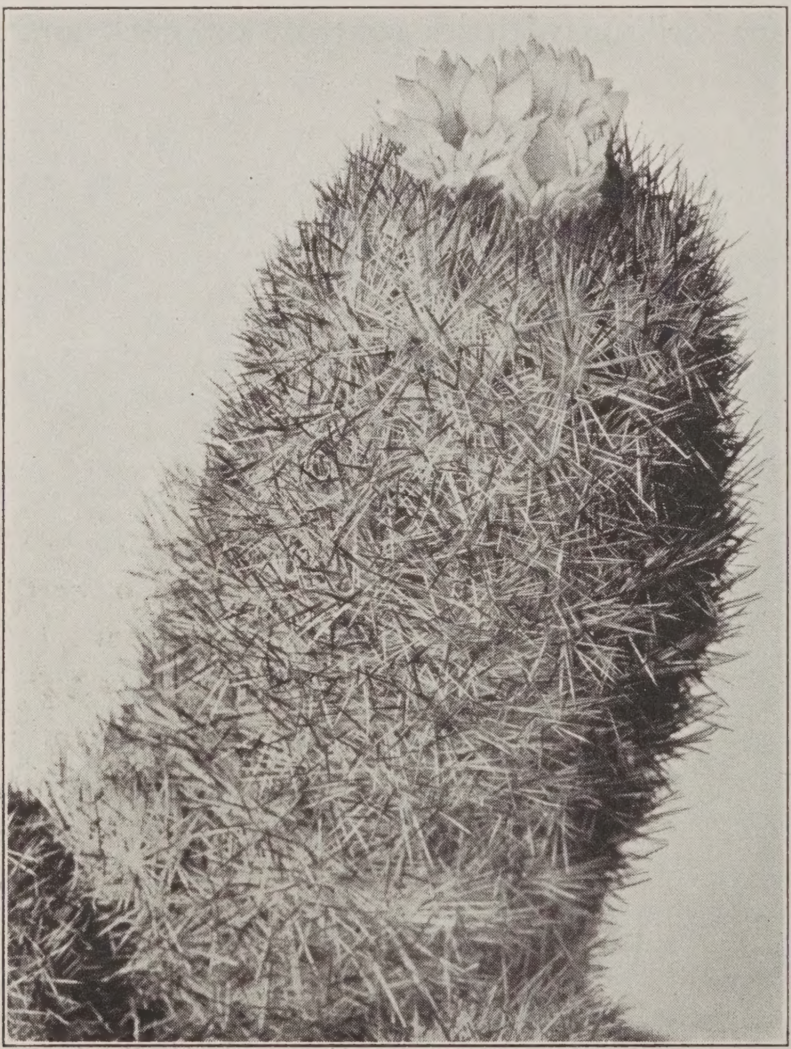
The Neolloydias are spiny little things, the representative on this side of the Southern boundary being N. texensis, a native son of Texas. Small and bristling, it is very striking with its contrast of black and white spines.



CORYPHANTHA AGGREGATA
Flowers vivid crimson running into mauve

The Coryphantha, bearing its flowers on top, has quite a number of very interesting members in our southwest, Texas listing eight, while New Mexico and Arizona claim their share and California has one all her own, though straying occasionally over the line into Nevada.

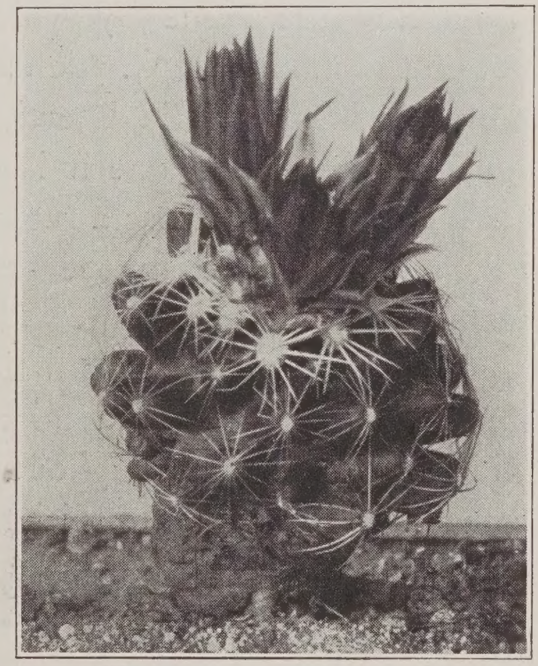
The C. macromeris (*Engelmann*) *Lemaire*, a Texas habitant, and its sister and rival, C. runyoni, have long, sharp, needlelike spines, their color varying in the two



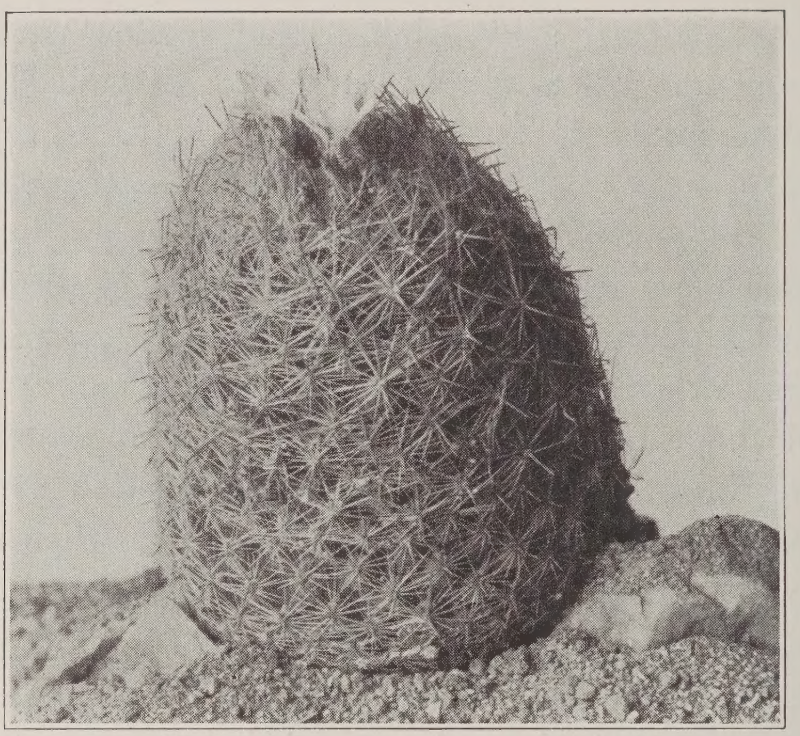
CORYPHANTHA DESERTI (Syn. Mammillaria deserti)
California Foxtail Cactus

species; and soft, silky, pink to purple flowers, rather large and somewhat delicate in texture. The illustration of C. macromeris shows the flower admirably. C. echinus, also a Texan, is completely covered with its spines which, nearly white in color, seem particularly aggressive. C. neo-mexicana (*Engelmann*) or radiosa is a beautiful little thing with its spines like white stars, and its pink flowers clustered at the top. C. aggregata (*Engelmann*) has a spine arrangement not so starlike in its arrangement and showing brown in its coloration; this is often confused with C. arizonica, the two seeming similar when apart, but not at all alike when together. The flowers are not the same color, the C. aggregata being a vivid purple running into mauve, while the C. arizonica is rose pink. The blossoms of both are large and showy.

California's representative, whose local name is the Foxtail Cactus, is an odd and striking plant. Its spines are numerous and interlaced, entirely hiding the body of the plant. The coloration of the spines varies, being in general light in tone, sometimes almost white, tipped with brown running into purple, and with tawny shades in the depths which give to the Cactus the appearance



Neobesseya missouriensis

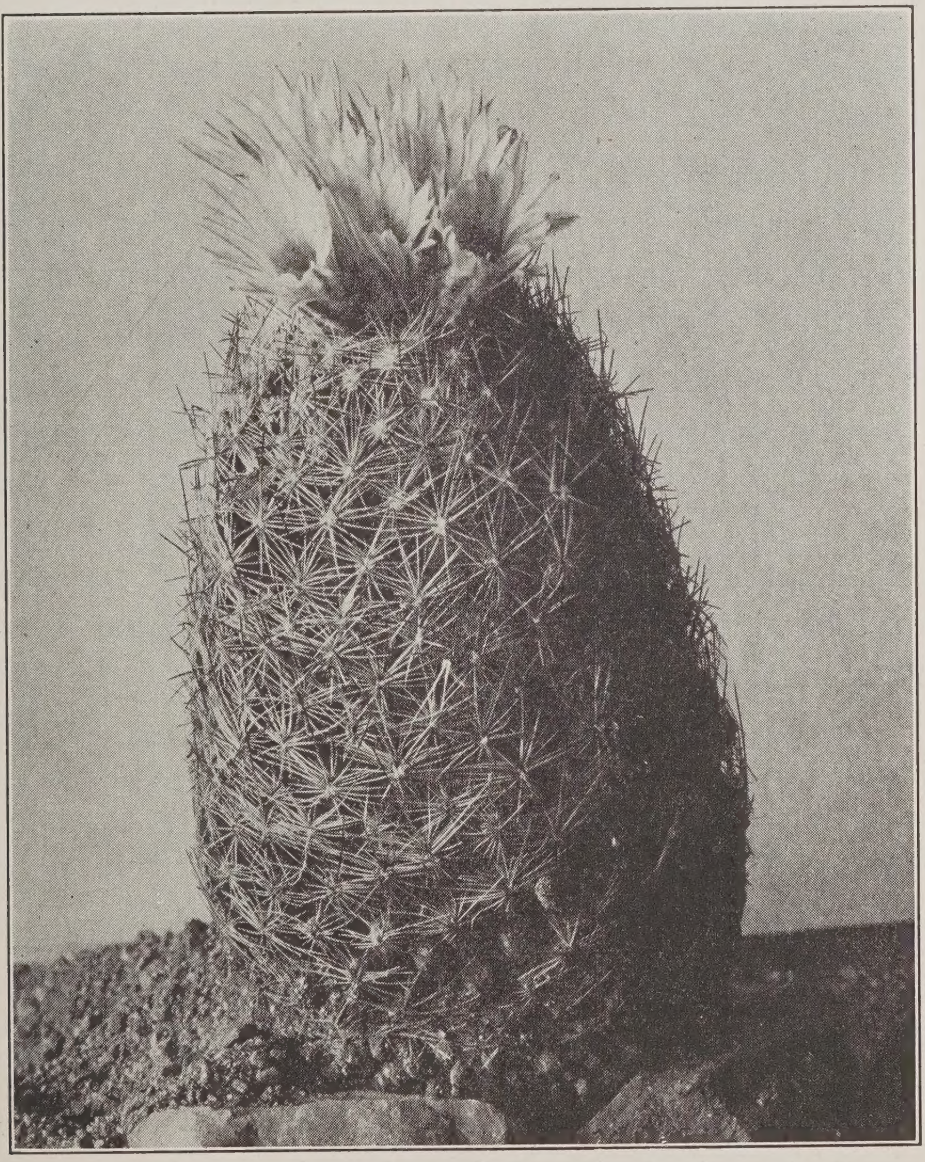


ESCOBARIA TUBERCULOSA

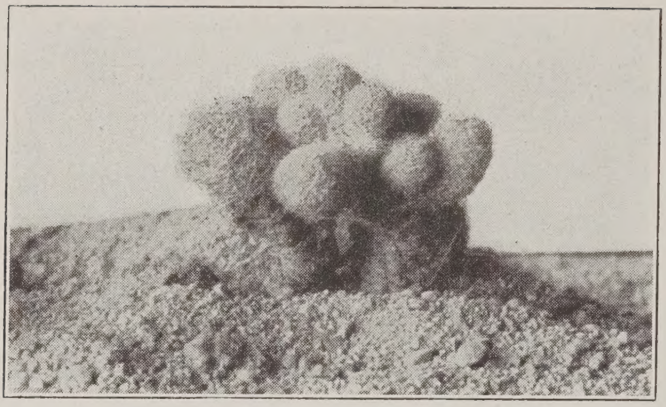
simulating the name by which it is well known. Its botanical name is C. deserti (*Engelmann*), formerly known as Mammillaria deserti, and also listed as M. alversoni, under which name it is sometimes considered as a distinct variety. It has a rather small light pink blossom which, springing from the dense, dusky spine growth, seems almost incongruous.

Missouri has a pretty little plant. Neobesseya missouriensis, (Mammillaria missouriensis, *Sweet*). This is widely distributed throughout the Middle West. It is an attractive little plant, with yellow blossoms and red fruits.

Texas comes to the front again with a contribution of several little Escobarias. E. tuberculosa (*Engelmann*) is illustrated on page 82. Escobaria bella, a new species presented by Britton and Rose, is a neat little plant, similar in appearance to the last, but larger. With its full little bunch of pale pink flowers at the top of the plant it is rather attractive. E. sneedi, a new species listed



ESCOBARIA BELLA



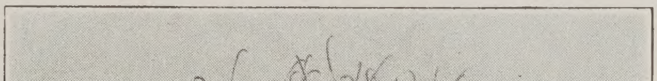
ESCOBARIA SNEEDI

by Britton and Rose, is tiny all the way through, in size of joints, spines and flowers. The heads are no larger than the end of the finger, the spines about one-eighth of an inch at most. It is rarely found, being closely confined to a definite locality.

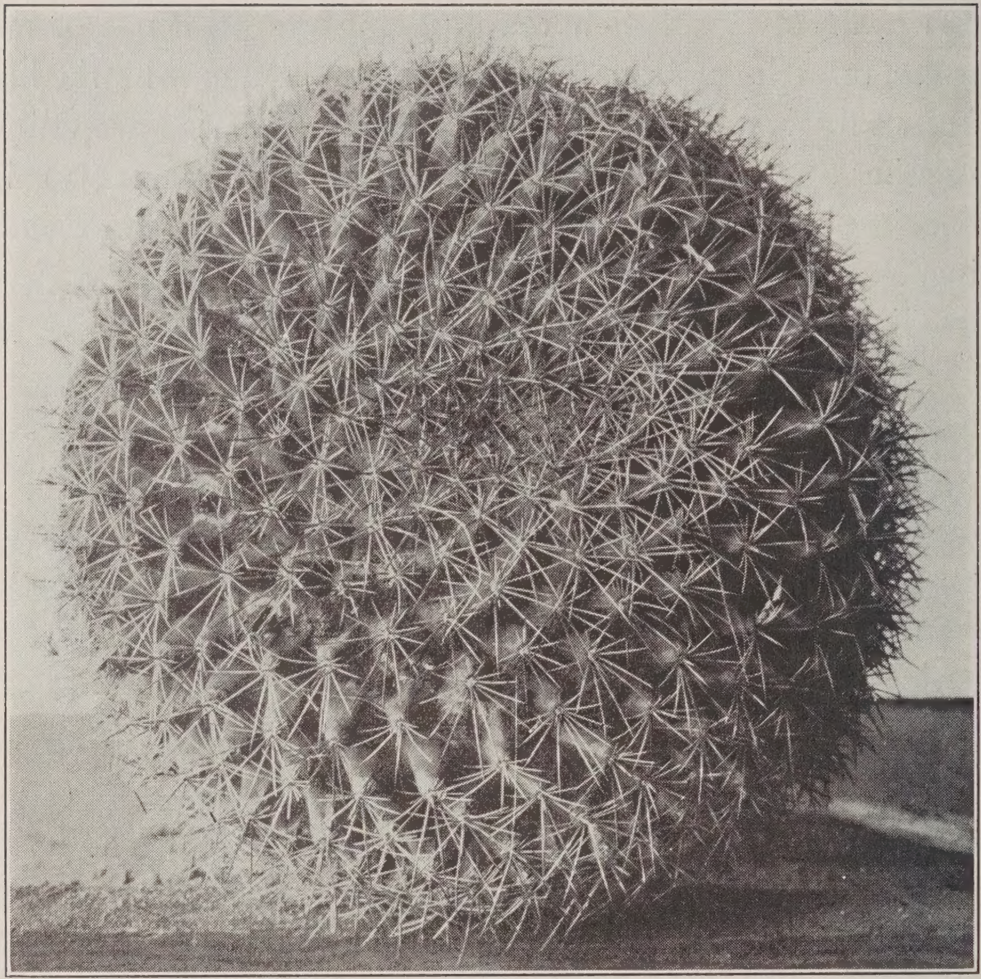
California adds to the list the Phellosperma, set aside as a new genus, because of the variation in the character of its seeds. It is a pretty little Cactus with a white starlike spine formation, and belongs to the numerous brotherhood of Fishhook Cactus, because of its brown central hooked spine or spines. Its blossoms are very shy, opening only during the short period of the full midday sun. And even then it apparently does not fully expand, for its stamens, in spiral formation, never seem to uncoil even in the brightest moments of its fullest blossoming. It has a beautiful pink flower. Long known as the Mammillaria tetrancistra, or M. phellosperma, both names being assigned by Engelmann, it now is called Phellosperma tetrancistra.

Mammillaria, an old name (*Haworth*, 1812) descriptive of the nipple formation, has been discarded by

Britton and Rose, their reason being the prior use of the same term in another connection. Neomammillaria has been substituted for it. The Neomammillarias are found in the Southwest United States and (numerously) in Mexico, and in Central and South America, one extending as far North as Utah (N. microcarpa). They have small scarlet fruits, which give this group the name of Strawberry Cactus, a term that has also come to be of wide application. They are in shape like a little chili pepper, and are called by the Spanish speaking people Chillitos, little chilis. They are often as pretty as the blossoms and as decorative. The N. applanata (see illustration facing page 73) is like a little Christmas wreath; the little scarlet fruits persist, and are still found on the plant



PHELLOSPERMA TETRANCISTRA
This bears a beautiful flower that has been described
as wine color—a dark clear pink



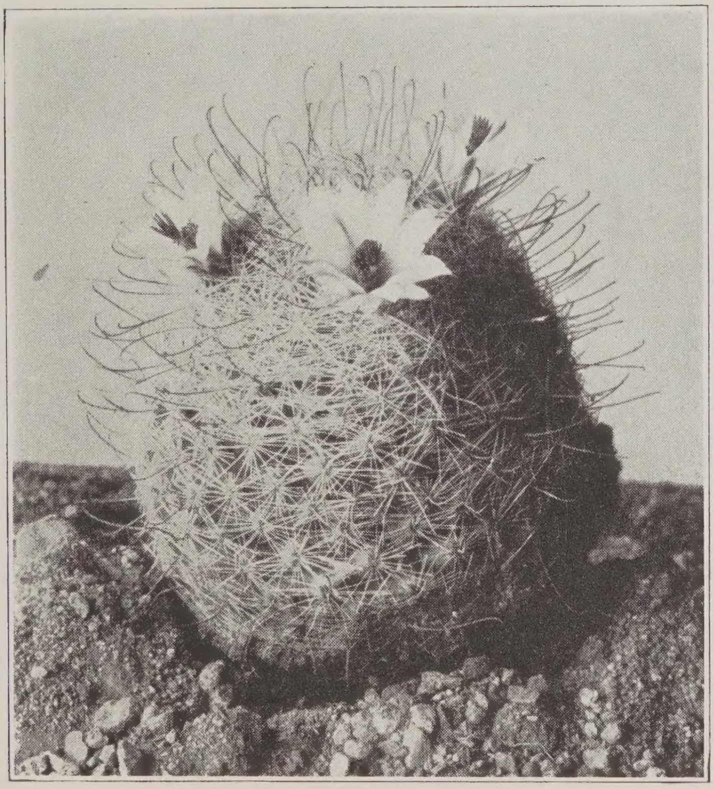
NEOMAMMILLARIA MACDOUGALI

when the flowers of the coming season appear. A little circle of red fruits, and another of the flowers, white with tinge of pink and wood brown on the outside of the sepals, all against the rather bright background of the cactus body, form a most lovely ensemble.

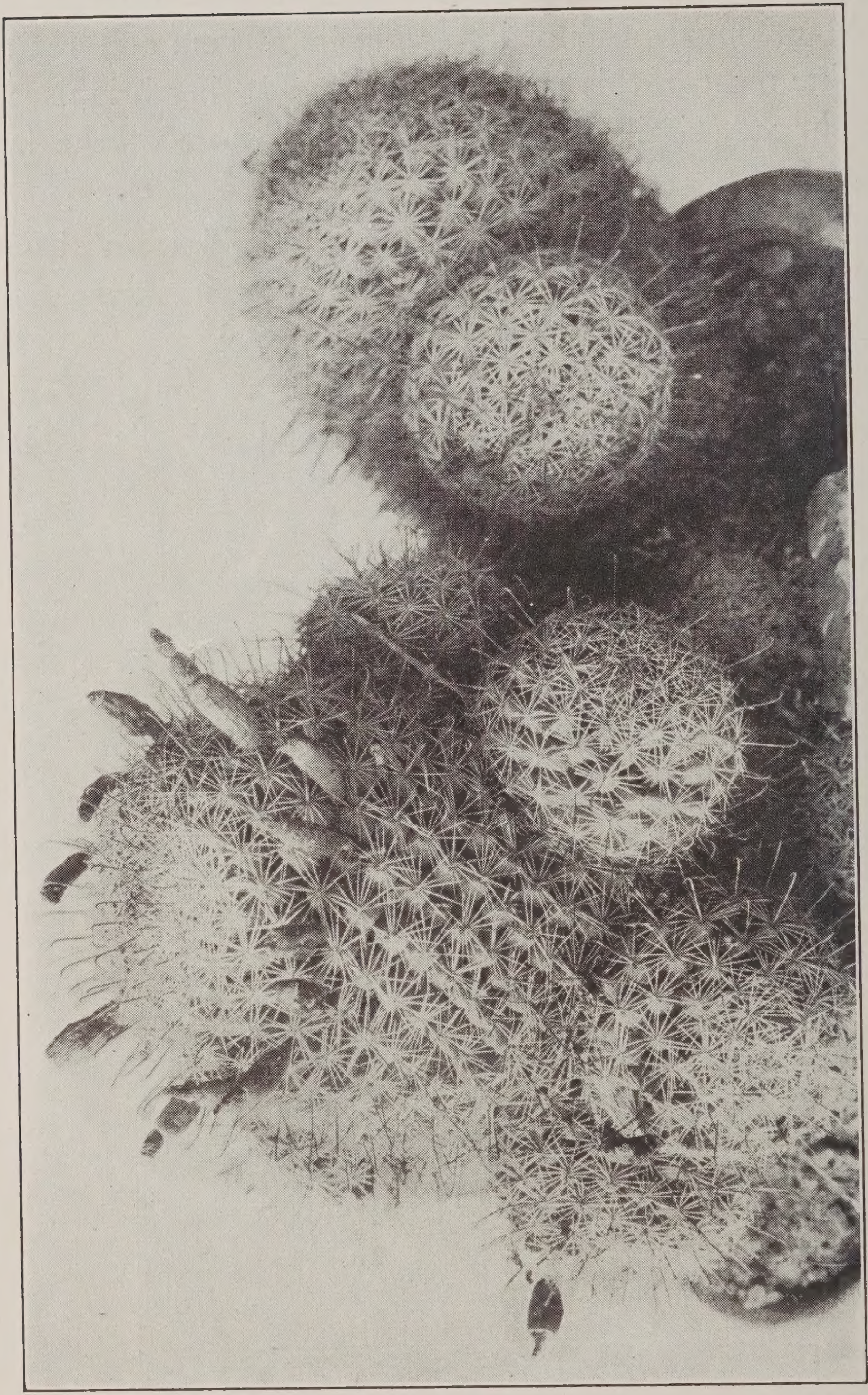
N. denudata (formerly known as Mammillaria lasiacantha var. denudata), a tiny button Cactus, hardly an inch in diameter, is an ambitious one for its size, and valiantly evolves a blossom a half inch in diameter.

Neomammillaria macdougali (*Rose*) was collected by Dr. MacDougal, whence its name; its flowers are creamy and, like most of this genus, its fruits are tiny bright red, club shaped, similar in appearance to those of the last named.

N. microcarpa (*Engelmann*), sometimes known also as Mammillaria grahami, is one of the all inclusive fish-hooks. It is a dainty one with white spines and dark, hooked central spine, and has generally several blossoms open at the same time in the form of lovely little pink stars.

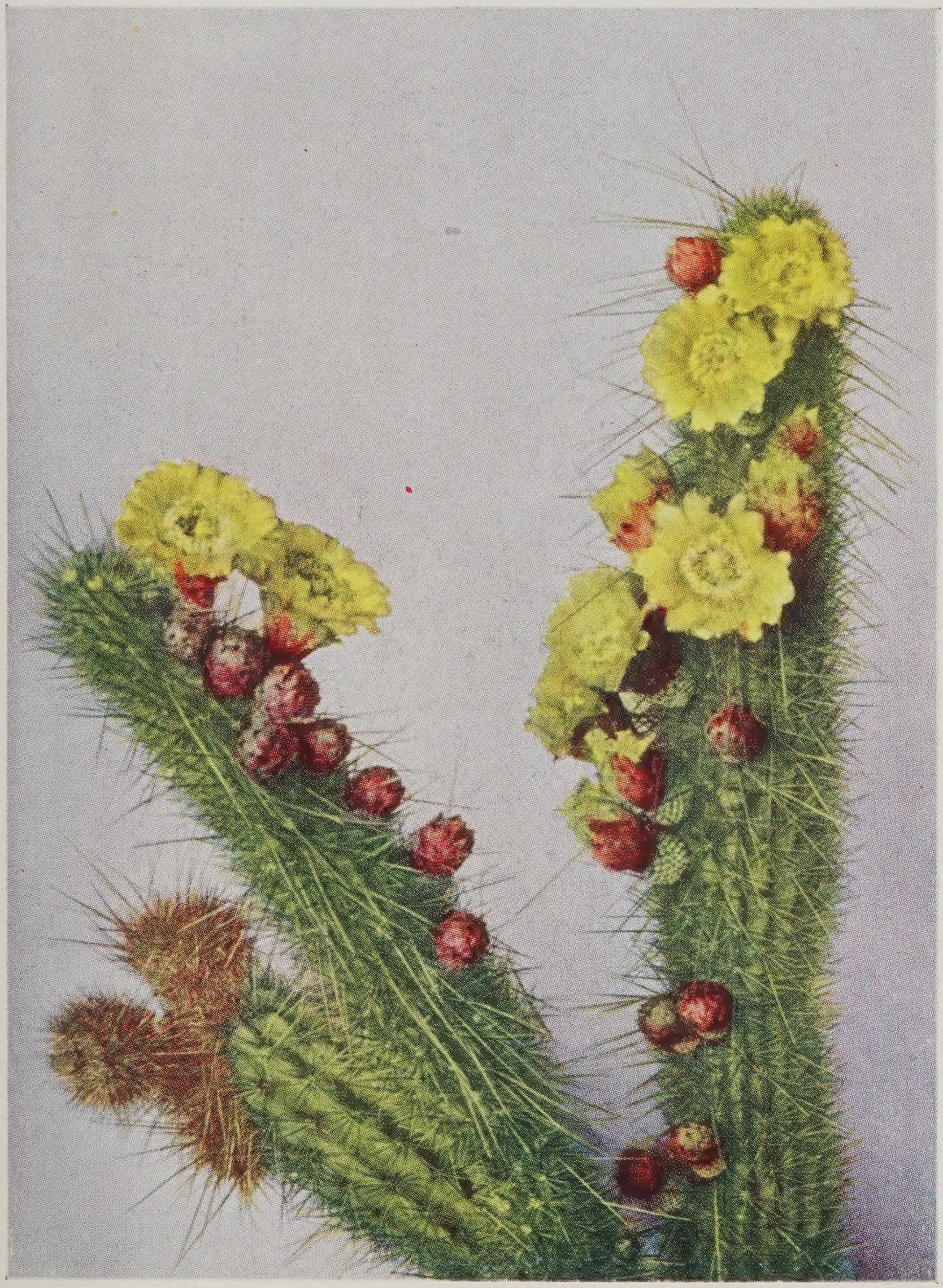


NEOMAMMILLARIA MICROCARPA
(Syn. Mammillaria grahami)



NEOMAMMILLARIA DIOICA

Fruit bright red, acid in flavor and rather agreeable. Imperfectly diœcious



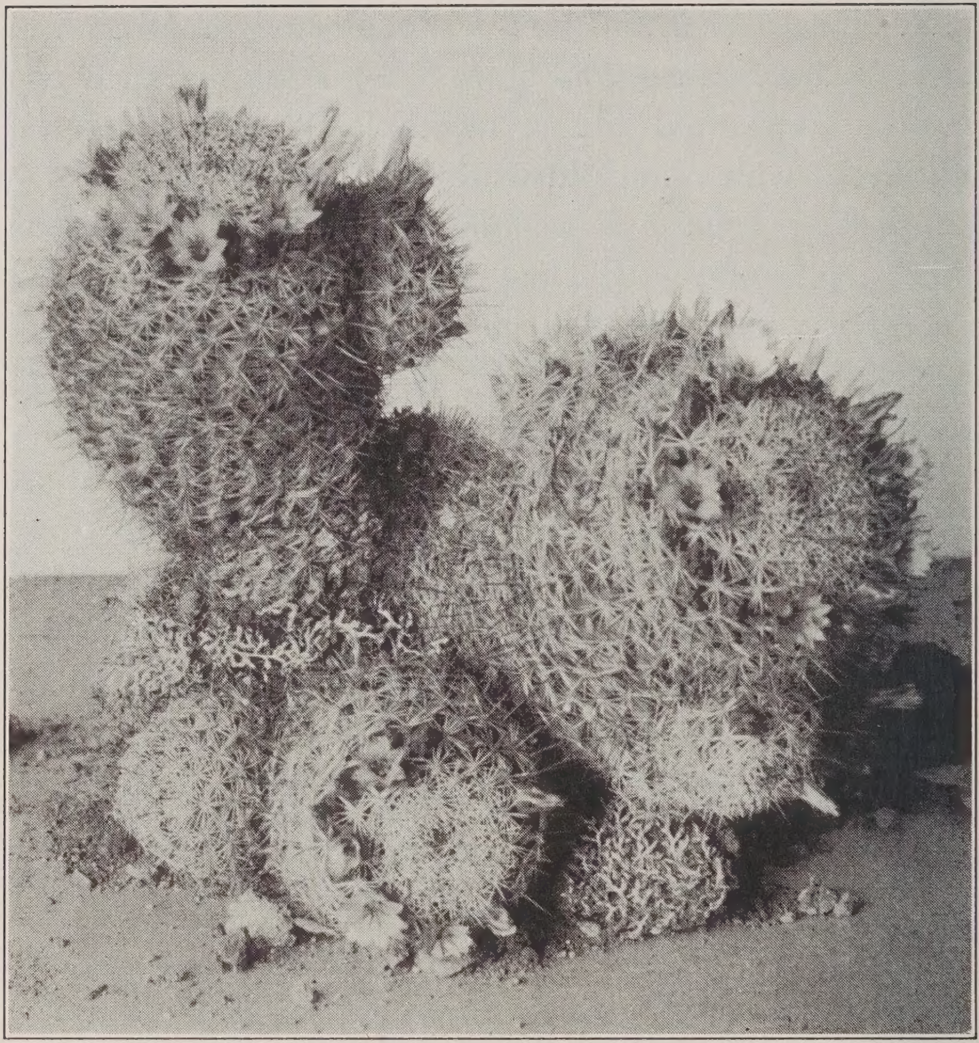
Bergerocactus emoryi

N. dioica (*K. Brandegee*), although first discovered in Lower California, is found quite abundantly in San Diego County, California. It is incompletely dioecious; the plant from which the illustration was made had, so far as observed, only one staminate flower. Eighteen or twenty fruits matured. The description of the blossoms as a dirty white seems to be rather in the nature of a libel; the flowers are really a creamy white with a tinge of green, and have a pink stripe down the center of each perianth segment, making it rather more attractive than the description would seem to suggest. The plants are single or caespitose (several heads from a single stalk) and the blossoms form little wreaths around the heads.

The fruits on many of the Mammillarias are edible; slightly acid, they are pleasant to the taste. It would seem rather a tedious task to pick them in sufficient quantity to repay for the energy expended; nevertheless, they are so used, and are even spoken of as possibilities for cultivation for their fruits.

RHIPSALIDANAE

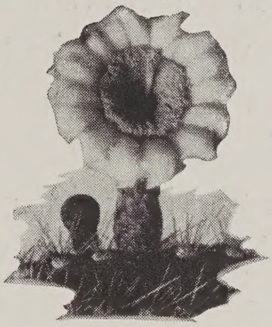
The last representative of the Cactus family to be presented as found native in the United States is that of a member of the Rhipsalidanae, on which Britton and Rose comment, "It is difficult to explain to most people that its species are really Cacti." Found in tropical America mostly, it is the only division of the family that has been found indigenous to any country outside the western hemisphere. The Rhipsalis cassutha, *Gaertner*, is the sole representative of its kind in the United States. It is found in Florida, and is epiphytic (an air plant).



NEOMAMMILLARIA DIOICA
Flowers creamy white with a pink stripe

Its stems are slender, but about one-eighth of an inch in diameter, and it trails from the branches of trees in long bunches. Its flowers are very minute and scattered singly along the stem, with resulting minute pink fruits.

In considering the Cacti of the United States, no effort has been made to present exhaustive lists, but rather to give typical species. It is hoped that at least some pleasure will be afforded the reader, and that the altogether incomplete representation, will arouse in at least some minds a desire for deeper and wider acquaintance with these plants which occupy a place so unique in floriculture.



CHAPTER IV

*Some Favorites Old and New

To those of the Southwest, where cacti flourish so abundantly, the word brings to mind, with the force of familiarity, the Prickly Pear and the Cholla. To the Eastern mind there come visions of the Night Blooming Cereus, whose flowering is still an event looked forward to, the occasion of a gathering of the clans to watch the miracle, or of the Crab Cactus or Christmas Cactus, with its long claw-like stems and bright blossoms, or the Rat-tail Cactus, with its slender pendent stems and red flowers.

These have been so long in cultivation and have become so familiar that they are far better known than are the natives of our desert land.

And there are others which are so well known in cultivation that they are ever subjects of interest; others so new that to them the added interest of the unusual attaches; and so a few typical of these varied conditions will be noted and illustrated.

Of the Night Blooming Cereus, so called, there are several species. Coming into cultivation in the earlier days of Cactus collecting, they were enthusiastically received and cultivated, and there now exist many hybrids of these and of the Epiphyllums and Phyllocactus, which

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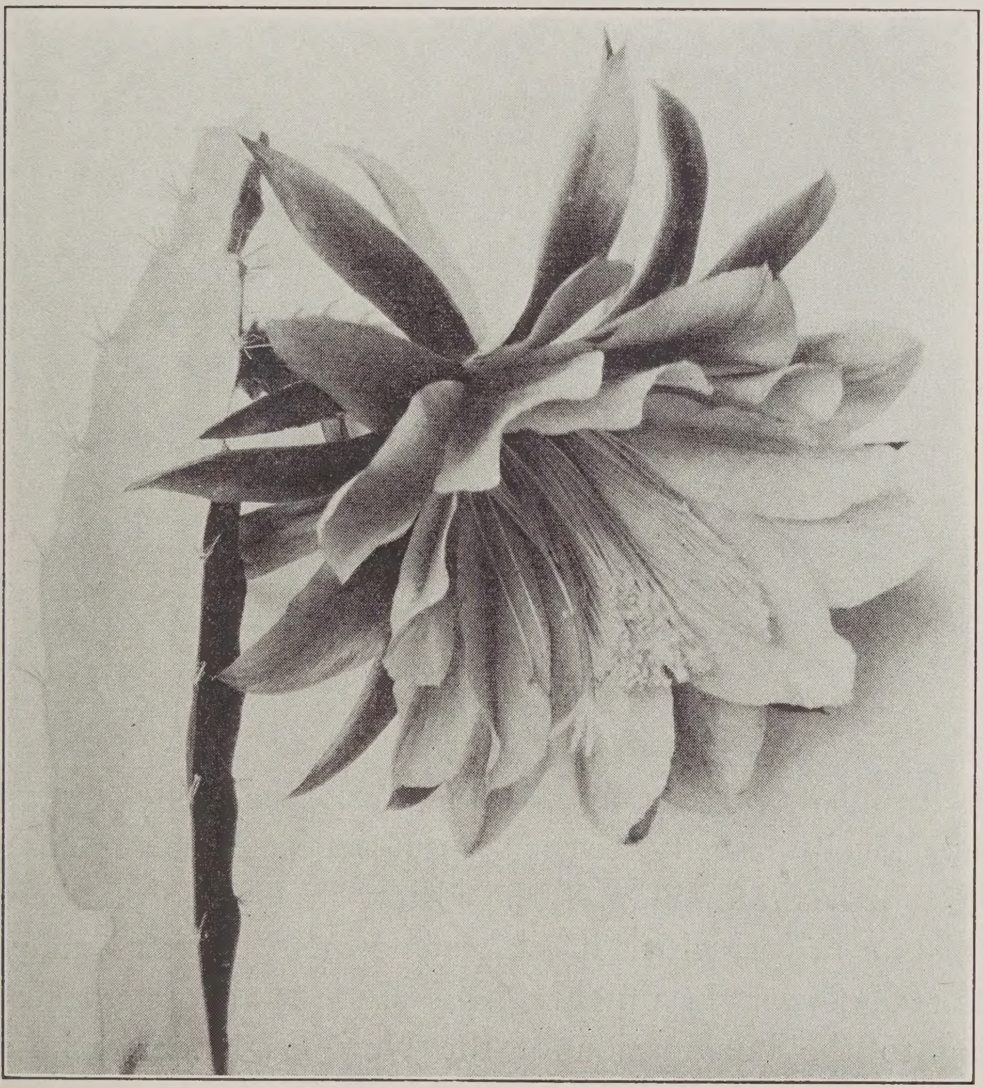
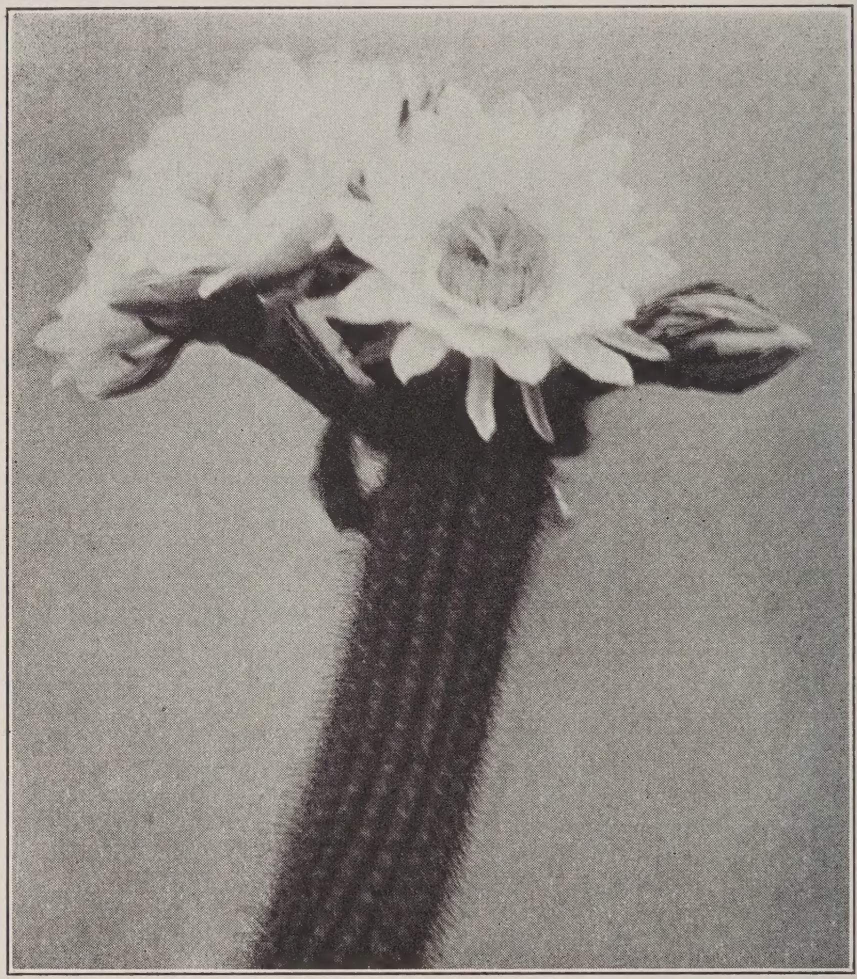
*Some of the illustrations of rare Cacti shown in this chapter were made possible through the courtesy of Mrs. Helen McCabe of the McCabe Cactus Garden, San Diego, Cal., who placed at the author's disposal many rare specimens.

then vied with them in popularity. Thus dealers list many varieties which have come into being through the efforts of the culturists.

Of our night bloomers, one of the widely known and popular species is the Hylocereus undatus (Cereus triangularis), its three angled undulating stems well de-

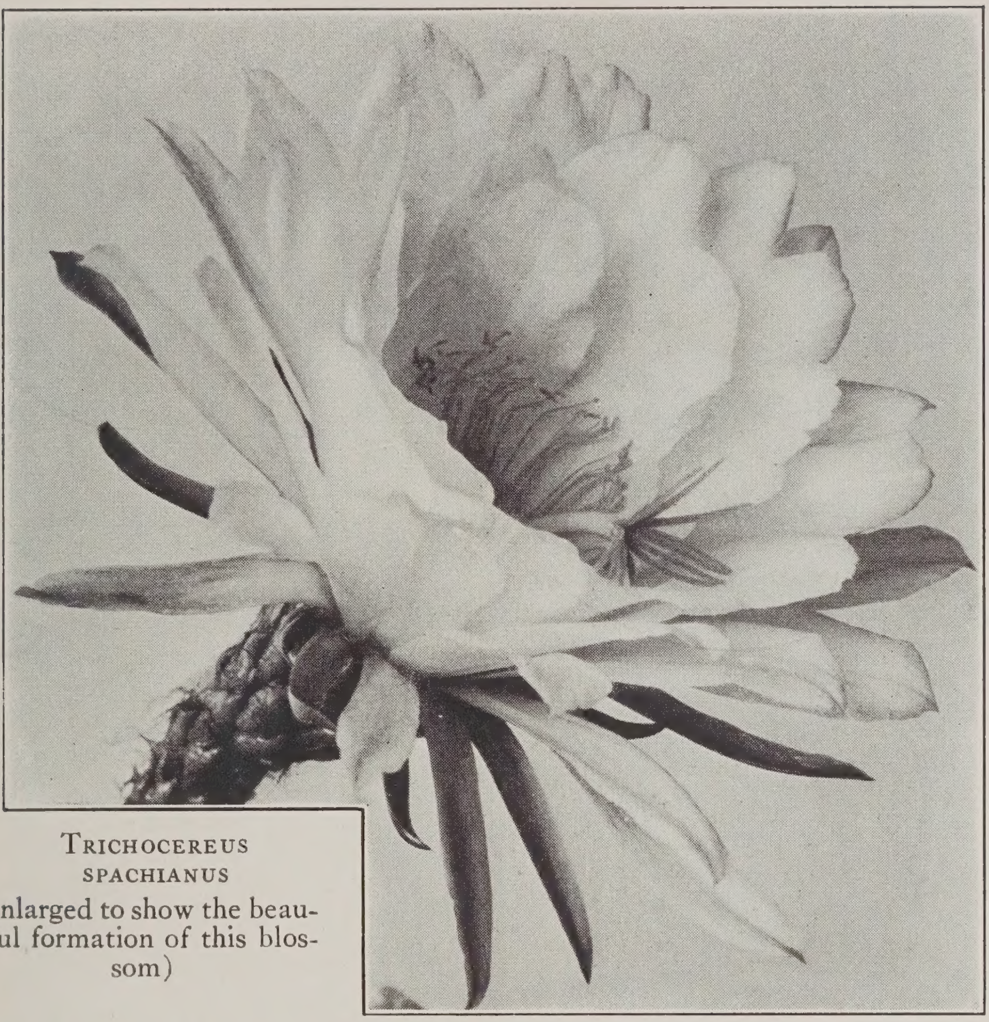


HELIOCEREUS SPECIOSUS HYBRID
Flower diurnal, of brilliant iridescent coloring. This Cactus, growing in the garden of Mrs. Williams, San Diego, Cal., had at one time fifteen of these blossoms, each about nine inches across



TRICHOCEREUS SPACHIANUS
Blossom life size

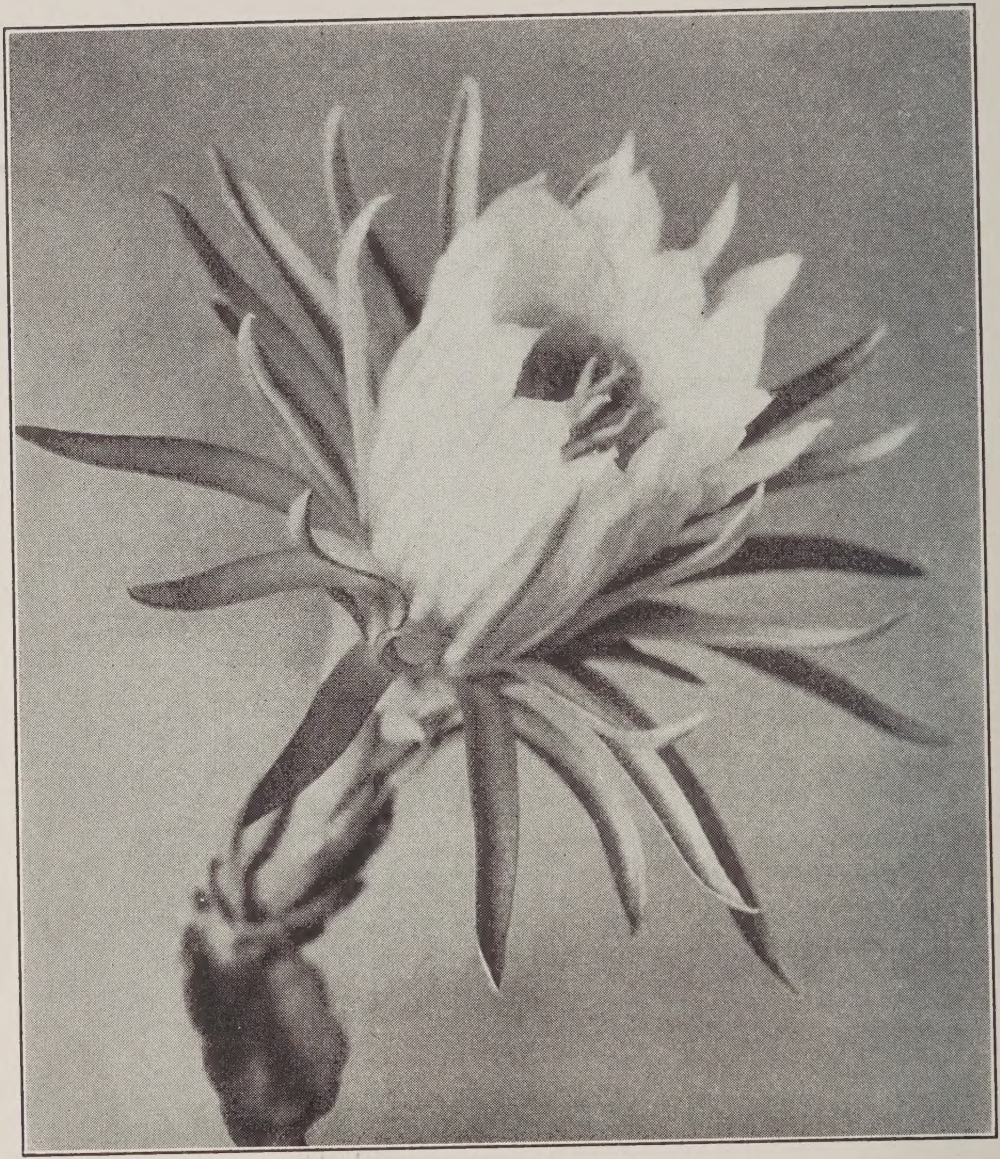
scribed by both its former and present specific names. The lovely, creamy, sweet scented blooms it bears have become very familiar to the visitor in Honolulu, where exists a hedge, which has been known to boast as many as 5000 flowers in a night. This vision is almost staggering to the imagination of the New Englander, whose ambition met its full fruition when he was able to invite his friends and neighbors to view the wonder and glory that was his—the single blossom that was the reward of



TRICHOCEREUS SPACHIANUS
(Enlarged to show the beautiful formation of this blossom)

weeks of watchful waiting. Or it might be the Selenicereus macdonaldiae (Cereus macdonaldiae) the Queen of the Night—"la reina de la noche." The wonder that is their blossom, and the sadness and awe that comes with the knowledge that only for one single night is such beauty to last, has always caused these plants to figure as a thing apart and given them an enduring place in our hearts and memories.

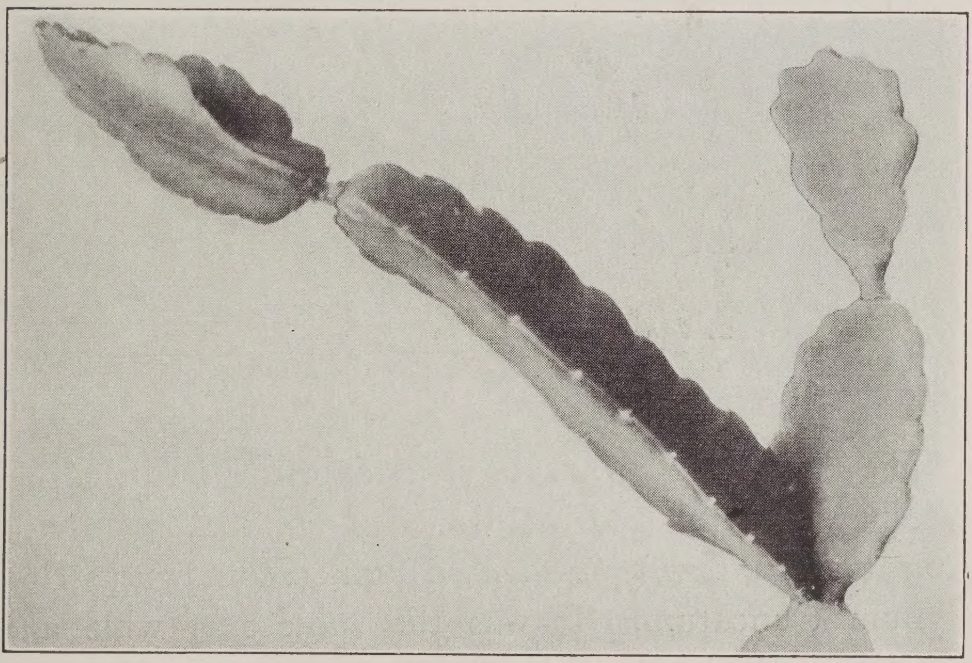
A plant in common cultivation, the Trichocereus spachianus, prolongs its blossoming into the day, and



HYLOCEREUS UNDATUS
This has been familiarly known as Cereus triangularis

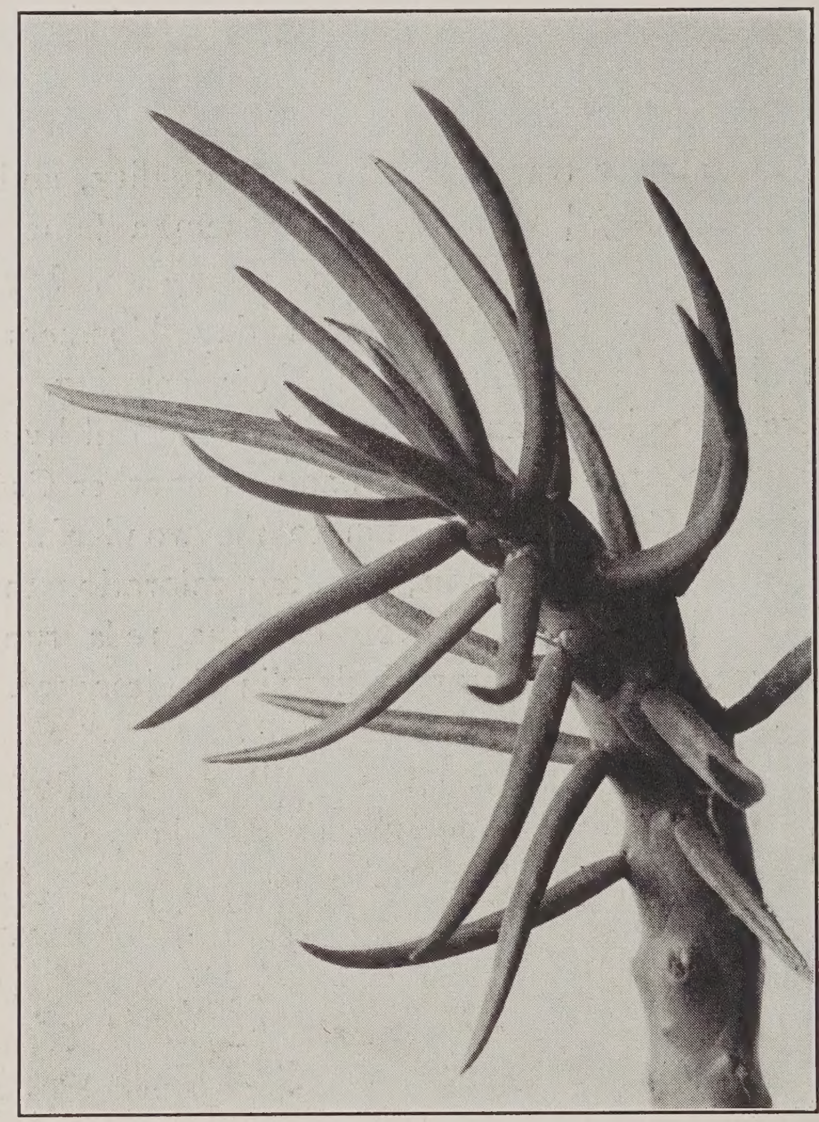
while it adds moments of enjoyment in its contemplation, it nevertheless fails to arouse the deep feeling that has somehow attached to the "Night Blooming Cereus," which is one of the cherished childhood memories of some of the older generation. Growing upright, perhaps three or four inches in diameter, a straight column, crowned with a cluster of lovely white flowers, it is nevertheless a beautiful sight. The petals of the white flowers are almost translucent in their quality, and the outer sepals, tinged with red, give them a faint pink glow.

Some of the brilliantly tinted day bloomers are wonderful and indescribable in their coloring. The Heliocereus speciosus, and some of its beautiful hybrids, justly appropriate the common name of another Cactus, the Rainbow Cactus, in allusion to the wonderful hues of certain of these blossoms, showing coloration unsurpassed in brilliancy, with deep carmine reds running into mauves, and changing with dazzling iridescence.



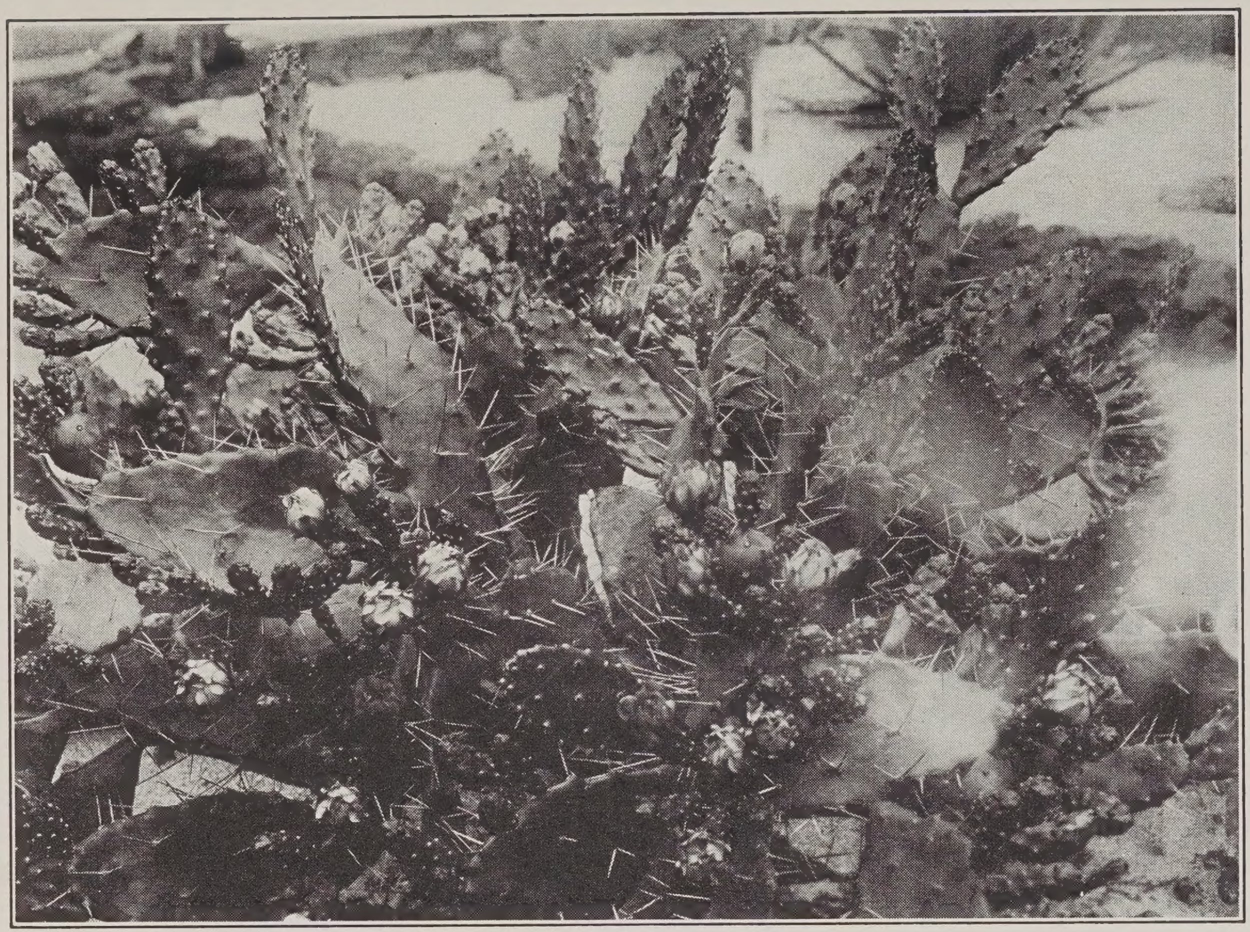
HYLOCEREUS UNDATUS

The triangular formation of the joint, which gave to it its former specific name of "triangularis," as well as the very undulating line, indicated by its present descriptive name "undatus," are here shown



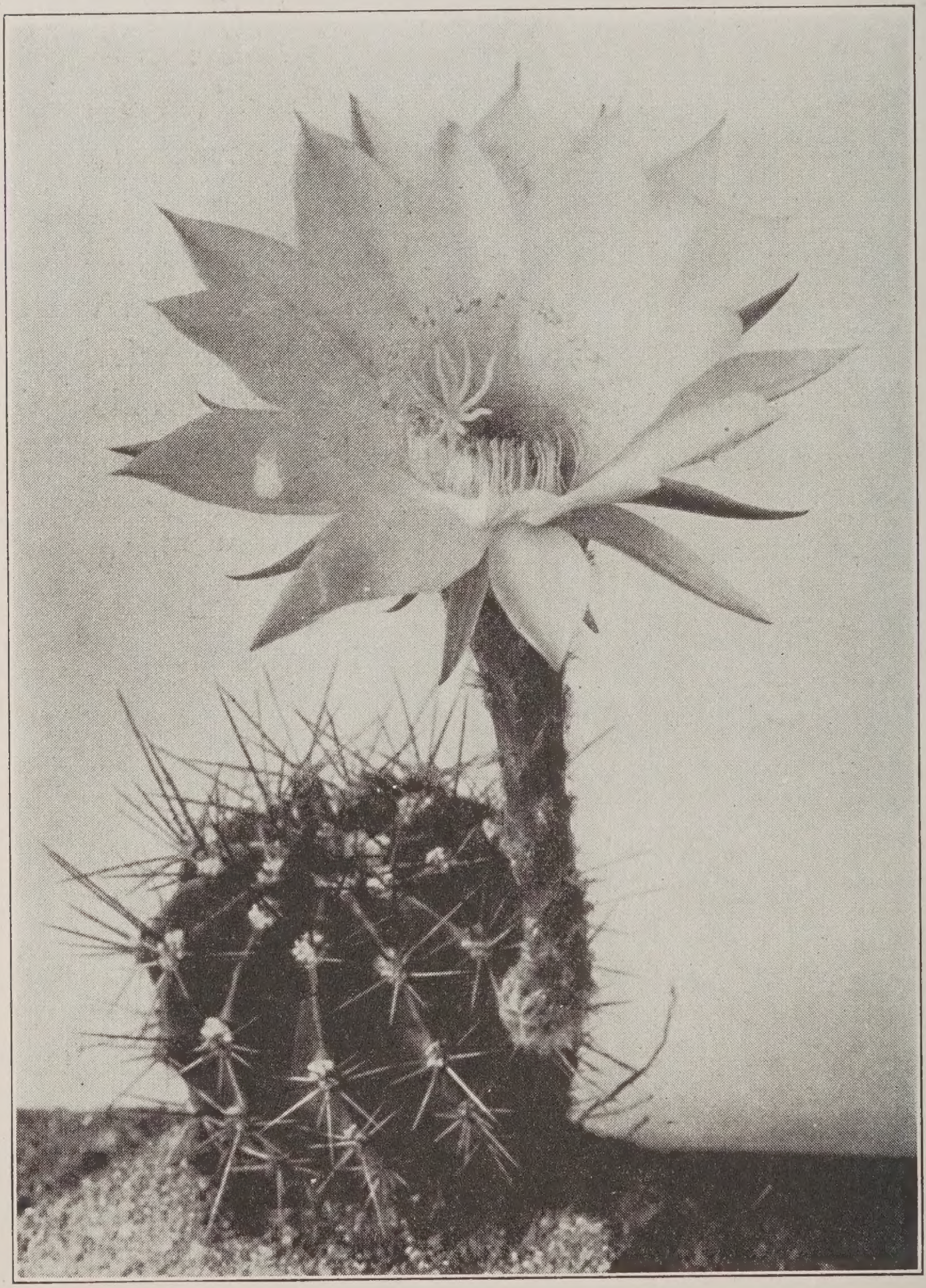
OPUNTIA SUBULATA

The Crab Cactus has been a favorite in cultivation since it was introduced in 1818. Its name is Zygocactus truncatus (*Haworth*), *Schumann*, formerly known as Epiphyllum truncatum. It was the subject of wide and successful cultivation in England, together with its near relatives, now known as Schlumbergera russeliana and S. gaertneri, of somewhat later introduction.

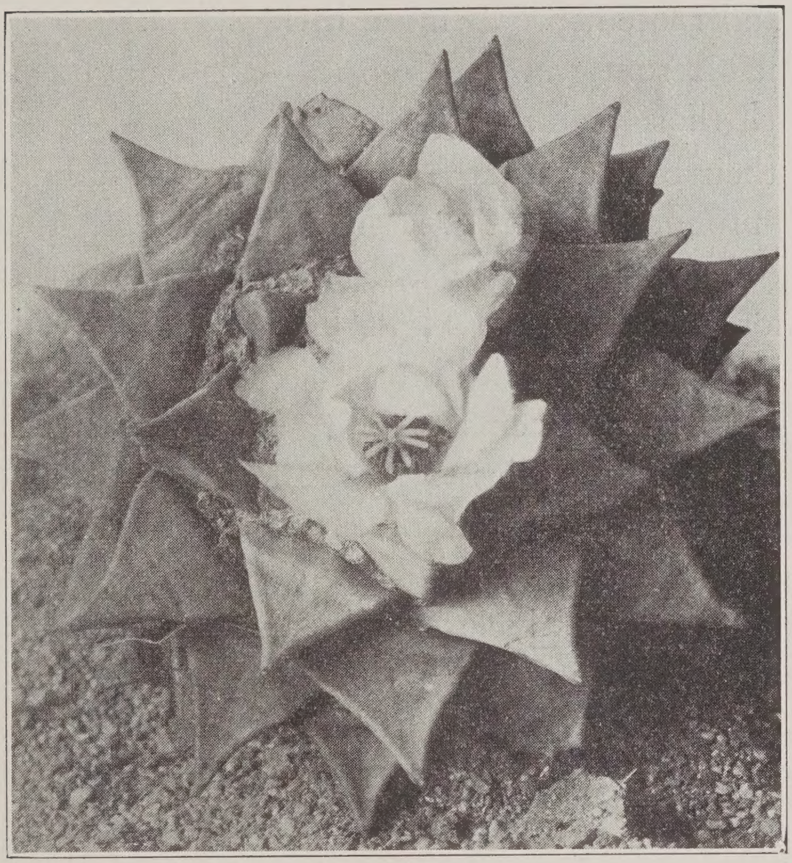


Opuntia monacantha
A South American Opuntia. very showy, and often seen in cultivation

An unusual Opuntia, O. subulata (*Mühlenpfordt*) *Engelmann* from Chile is well known in cultivation and presents, with its long fleshy leaves, the well known exception that proves the rule of leafless Cacti, for



ECHINOPSIS MULTIPLEX



ARIOCARPUS RETUSUS

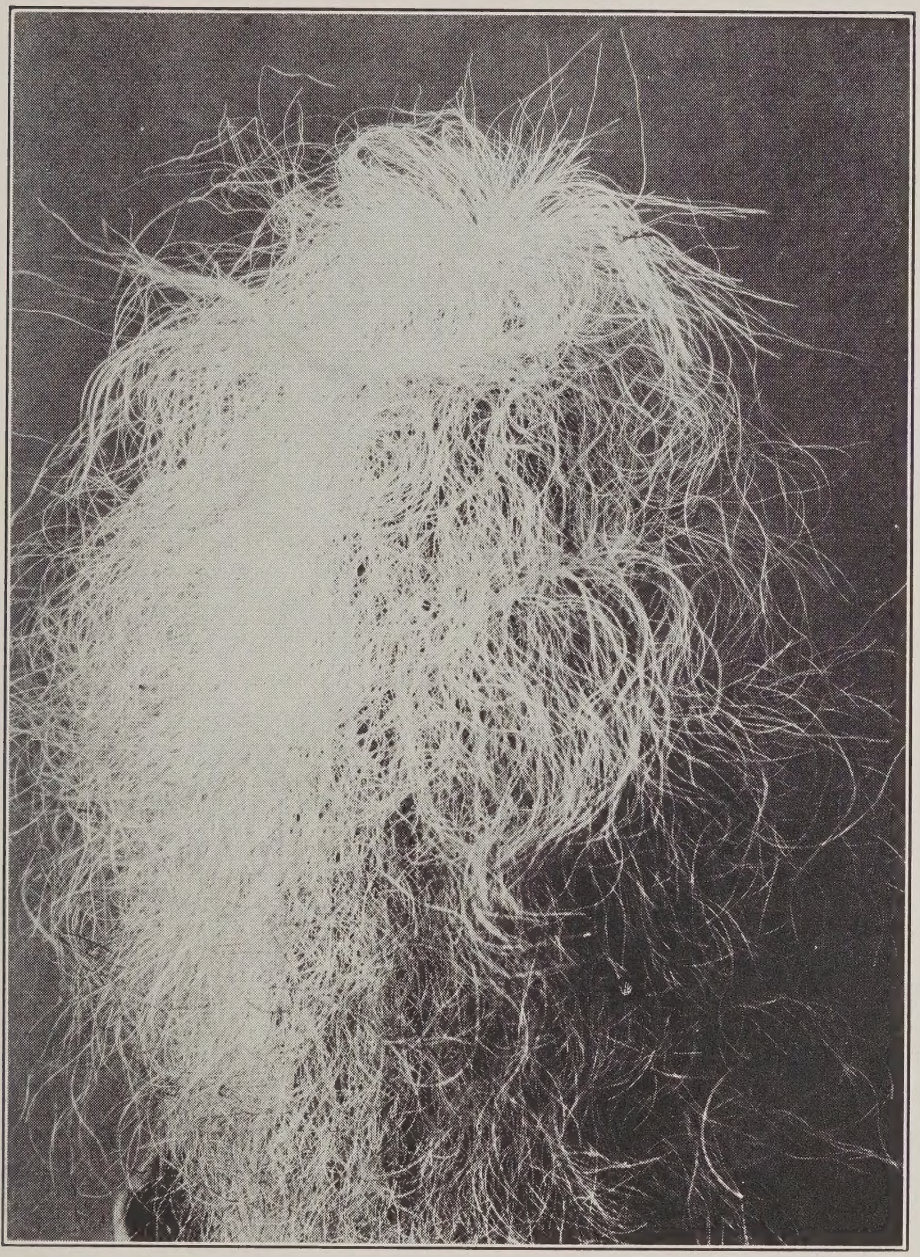
its leaves persist, and it provides an oddly different appearance.

Another of the South American Opuntias, equally familiar in cultivation, is the O. vulgaris, *Miller*, syn. O. monacantha, *Haworth*, which is a deserving favorite in cultivation. Its bright green and shining green joints, its bright golden-yellow flowers with its streaks of crimson, its rather large, pear-shaped fruits, often proliferous (another flower growing from the fruit) all tend to make it a showy plant; added to this is the fact that it is a rapid grower. The fruit is sometimes taken from the plant and rooted, producing a little upright knob with a brilliant blossom growing from it. It is one of the stunts in which those so inclined indulge.

In their blossoming the small plants of the Echinopsis group produce in the writer something of the same feeling of awe that comes with the flowering of the larger and more sophisticated night bloomers. Of white and the most delicate pink tints, they seem so ethereal in quality, it hardly seems possible that they spring from the small globose bodies that are their genesis. They are South American, diurnal in their flowering, and make most desirable plants for one whose space is limited or whose choice must include only a few specimens. One such should at least be a part of every collection of the kind. This one may well be Echinopsis multiplex (*Pfeiffer*) *Zuccarini*, with its beautiful rose-pink blossom. It is a prolific grower and a good bloomer.

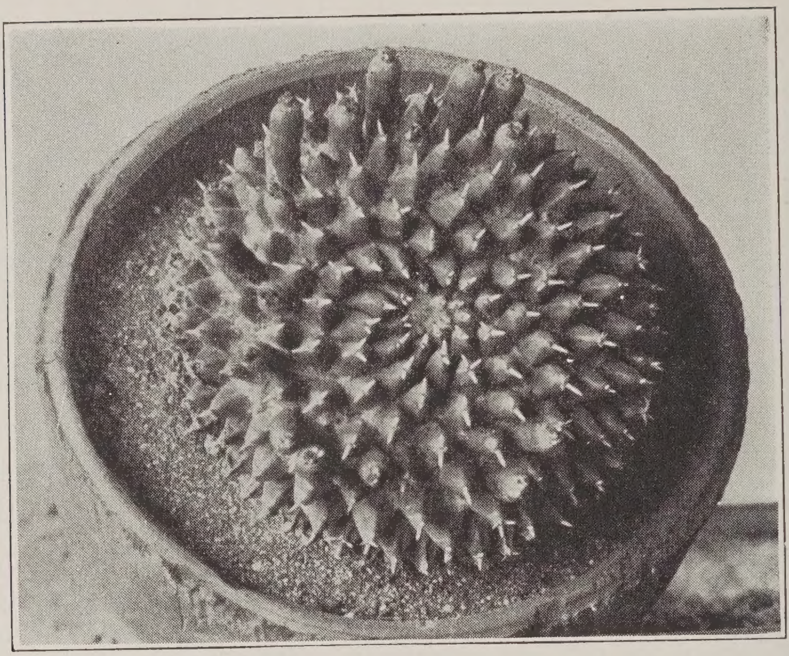
Ariocarpus retusus, *Scheidweiler*, with its metallic looking, angled background and its most delicate, almost transparent white flowers, sometimes with just a blush of pink, a Mexican relative of our more familiar Ariocarpus fissuratus or Living Rock, is one that should find a place beside its sister. There are only three of this genera, the two named and the A. kotschubeyanus (*Lemaire*), *Schumann*, also a Mexican with rose flowers. These three, all by themselves, would prove a most unique trio.

To those whose taste seeks the unusual and the curious, satisfaction is found in the possession of the Cephalocereus senilis or Old Man Cactus. This is native of Mexico and is most striking in appearance. Covered with long

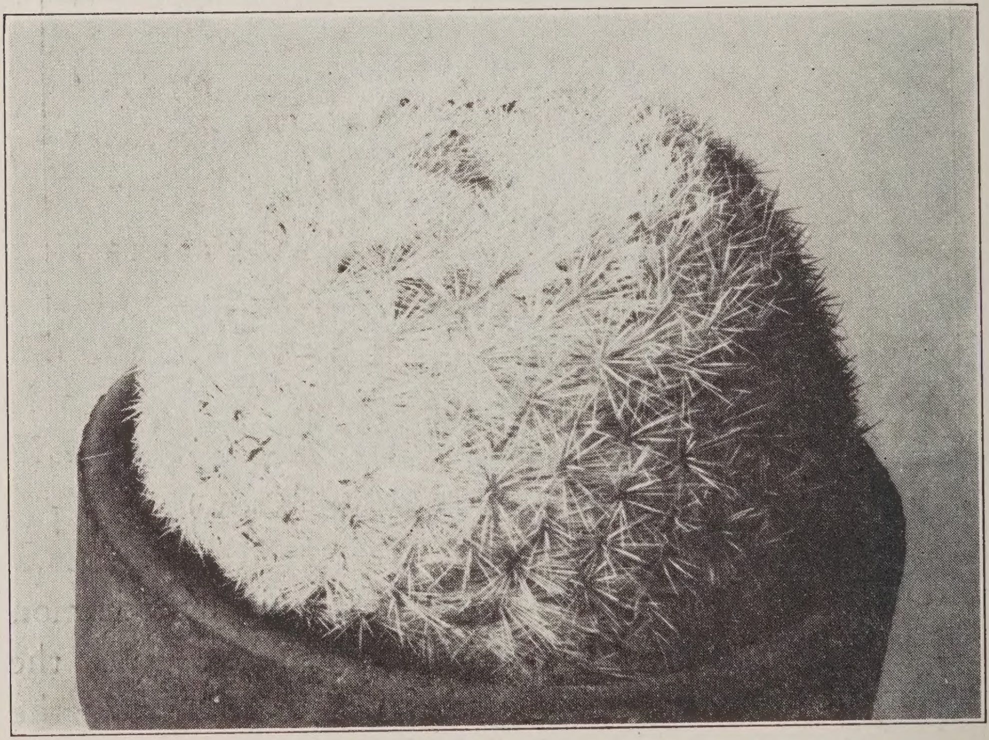


CEPHALOCEREUS SENILIS (The Old Man Cactus)

white hair, the resemblance that earns it its common name will be seen to be complete when one notes the manner in which the hairlike spines spring from the head of the plant; they part, making the resemblance to



NEOMAMMILLARIA SEMPERVIVI

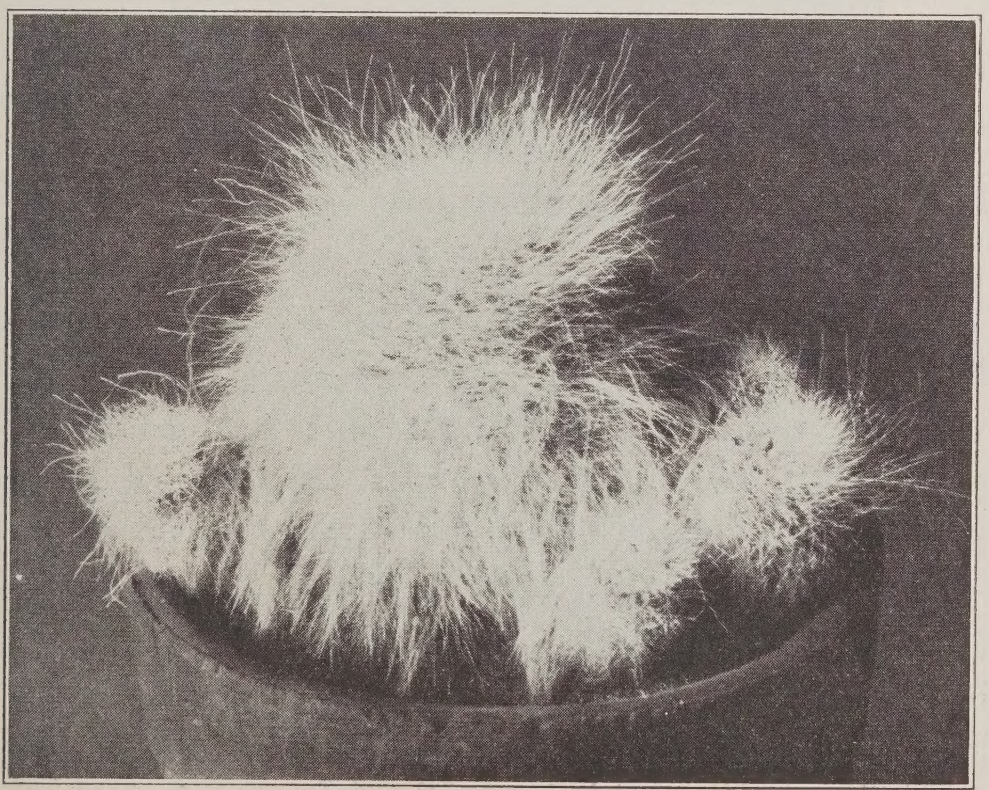


NEOMAMMILLARIA CANDIDA

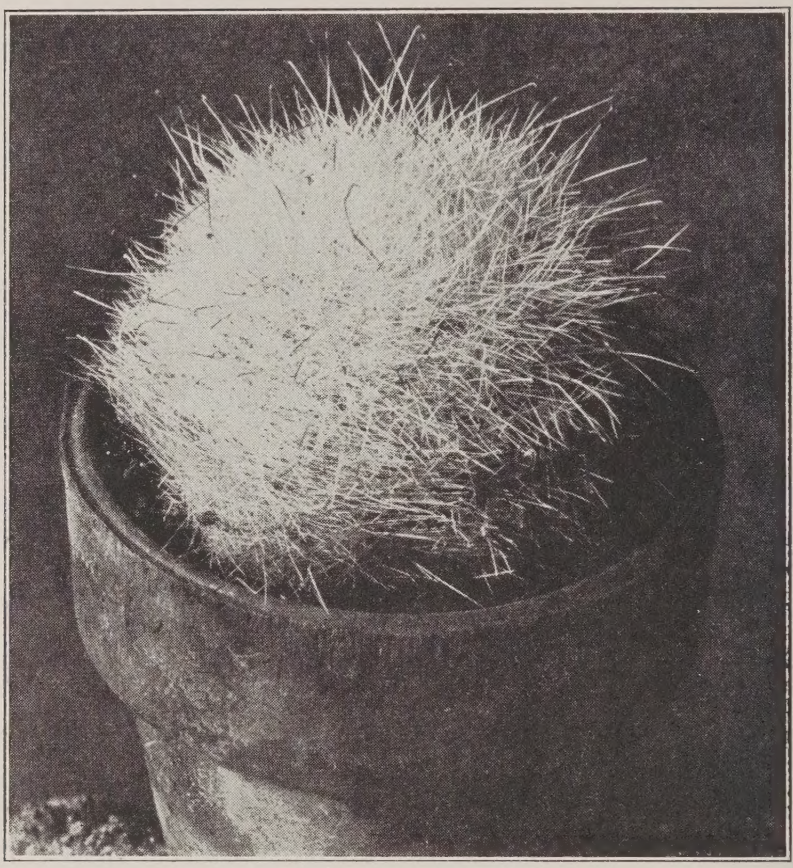
long white hair perfect. It has long been a favorite in European collections, and because of its position as a curiosity it is in great demand.

Seemingly a fit companion to it in this respect is the newly discovered Mammillaria hahniana, *Werd*, put on the market for the first time in 1929. A low growing Mammillaria, it is covered with the softest white hair; it produces offshoots readily, and has been dubbed the Little Old Lady.

Mexico has several of these small white spined cacti. The Neomammillaria candida (*Scheidweiler*) is one of these, a little more stiff in its spines; and the Mamil-



MAMMILLARIA HAHNIANA
A late discovery. "The Little Old Lady"



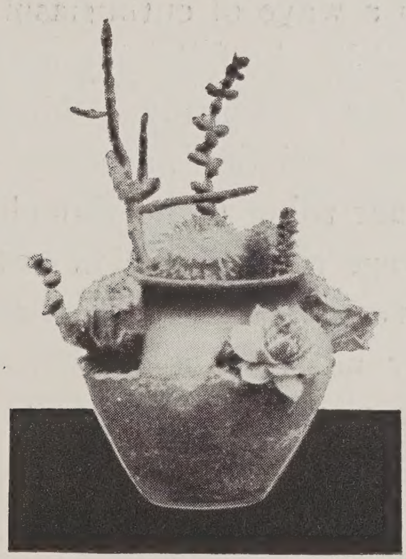
MAMILLOPSIS SENILIS

lopsis senilis (*Loddiges*), *Weber*, which, with its white hair, has also little white hooked spines. Furnished with fine, hairlike spines is also the Neomammillaria spinosissima (*Lemaire*), sometimes known as N. sanguinea, the spines, however, being reddish in color.

Mexico has many of the small Mammillarias which are most curious and attractive, and which might well be chosen as subjects in a window garden or small collection. For example, N. sempervivi (*De Condelle*) with small flowers, but with its bright fruits persistent, and forming a pretty contrast with its dark green coloring.

However, it is no part of wisdom even to begin to think of these, for Mexico's variation on the theme Cactus is seemingly infinite. Mexico is the "ultima thule" of the Cactus fan; to be turned loose with Mexican Cactus land at his feet would be to him indeed Cactus Paradise.

It is hoped that sufficient interest has been aroused so that, from the attitude of the man who asked, "A Cactus! a Cactus is a plant, isn't it?" may have grown a feeling of interest in this unique and comparatively little known family; even, perhaps, a sufficient interest that may mean the creation of an embryonic fan, with a definite "yen" for research along the lines which this subject opens up.



CHAPTER V

The Cactus and Its Culture

THE history of the popularity of the Cactus in cultivation has been manifested in recurring waves. A century ago it was at its height in England and Continental Europe, where indeed it has never entirely died out, although even there, in many instances, valuable collections have been allowed to be scattered and lost. In our own country there has never been the enthusiastic fervor that is apparent in Europe. Forty years ago it seemed that such a wave of enthusiasm was upon us, as would be indicated by the following note which appeared in Thomas Meehan's Monthly (Philadelphia, October, 1891): "There are societies nowadays for all sorts of things, but the last thing to be thought of, would be a society to encourage the cultivation of *Cactuses*; yet this is the title of an organization that has been formed in Baltimore. After all, it is a very meritorious society. There are few things more interesting than Cactuses. As a general thing, nearly all of them have gay flowers, although blooming but a few days or weeks of the year; and when we come to their cultivation, although many persons think it must be very easy, there are few things which are more thankful for good culture than plants of this family."

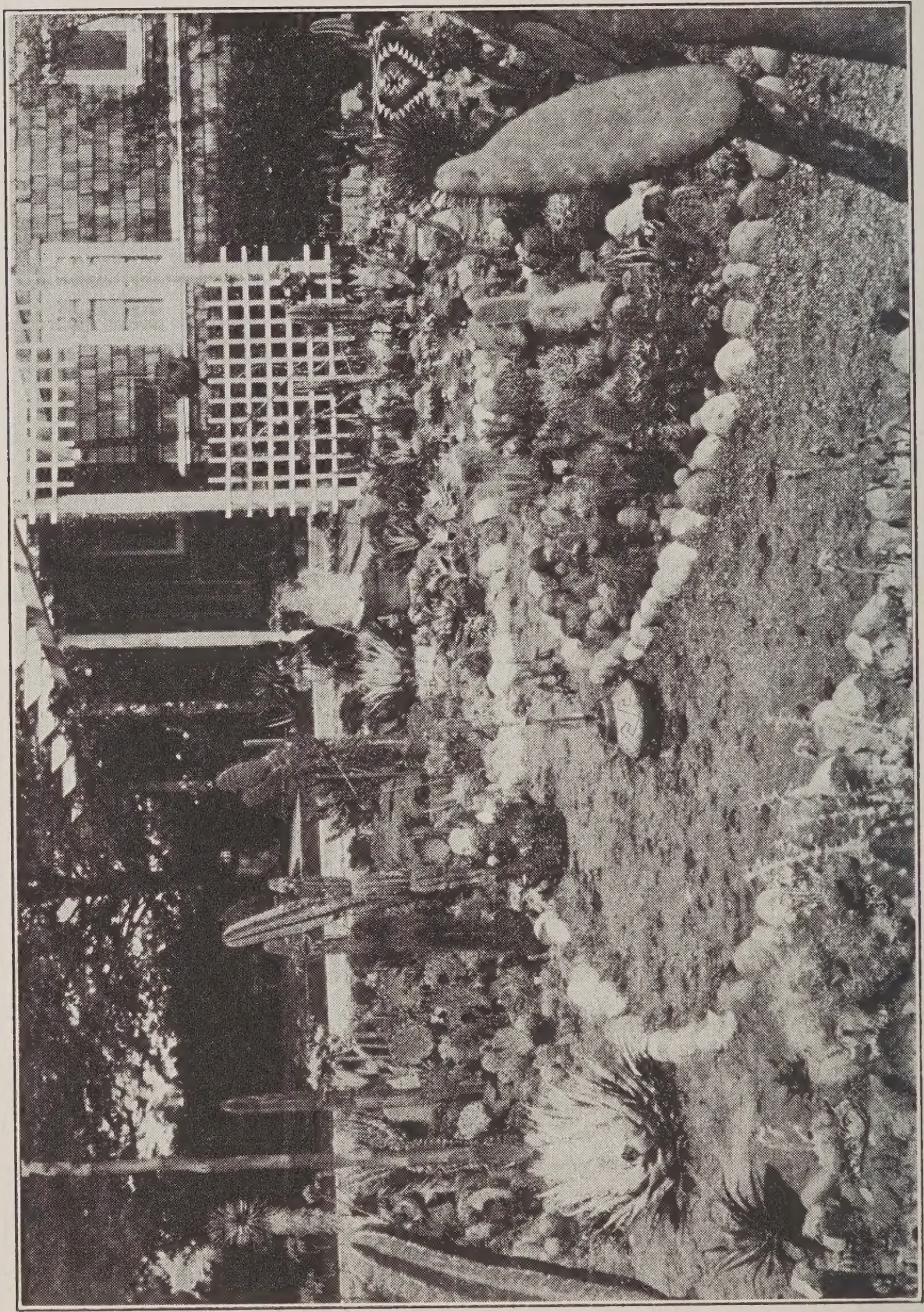
The present popularity seems to be based upon something more enduring than the passing fancy that had previously appeared only to die out in a short time; there are several reasons why this should be true; and the increase of interest rather than its recession, is evidence that it has been established on a permanent basis rather than adopted as a fad for the moment.

To confirm this we have first, the spread of the world consciousness which has interested us in the comparatively unknown vegetation of other lands and as well of hitherto strange corners of our own land. This has led to a knowledge of many varieties where previously but a few were known popularly, and in their tremendous variety lies one of their chief charms.

Again, the particular appropriateness of their planting, especially in locations of limited water supply, has led to their wide use, notably in the Southwest where water is a problem of ever increasing importance.

Added to these considerations is the fact that the Cactus is so widely distributed, finding representation through some one species or other in almost every section of our country, so that everywhere is available some variety that may serve as a nucleus for a collection.

Here we have three basic reasons for their culture increasing rather than diminishing. They may be cultivated with a minimum of care as compared with many other plant families; yet reward richly every attention that may be given them. Their culture should receive the same careful attention that is given to other plants.



A corner in the McCabe Cactus Gardens, San Diego, Cal.

SELECTING PLANTS FOR DIVERS PURPOSES

The first question that comes to mind is as to the choice of plants. In order to receive intelligent consideration this must be first answered in true Yankee fashion by asking another, or rather two more: Where and How?

There may be a large collection contemplated; a rock garden may be our objective; the setting for a patio to give it the wanted "atmosphere;" a stray corner in our grounds to be utilized; a group added which will give a touch by its unique quality; a window to be adorned; or perhaps just space for a single specimen, possibly the key to our decorative scheme, possibly to satisfy the longing for something growing under conditions where another plant would not be content with the neglect that a busy life ordains as its lot. In the larger spaces, where is contemplated a consistently planned garden with a regard for permanent effect, there will arise with each such project individual problems to solve, with such factors to consider as exigencies of climate, possibilities for landscape effects by reason of the contour of the land, or the personal wishes of the owner.

In the mind of the writer, a perfect setting for such a garden would be a sunny, gently sloping hill, which might be terraced; the variation in elevation forming opportunity for landscaping, while at the same time affording ease of access for close up study of any individual plant; so spaced as to insure ease of access for their care and opportunity to properly protect such plants as may require special attention. Last, but not least must be considered the necessity of providing proper drainage. However located, the landscaping problems must be worked out: the massing of heavy growth here, the elevation produced by the taller specimens there; a background provided for the smaller plants, and a niche for some choice individual specimen.

The Opuntia has not been as popular in culture as have some of the others; nevertheless, in the larger grounds they may well vie with the more stately and statuesque columnar Cacti. They lend themselves admirably to landscaping, are most of them quick growers,

A bit of rock garden from a private collection, Fresno, Cal.

and in the mass their flowers are showy. For large growth and quick development, O. ficus-indica, O. monacantha (of which there is also a form in which the pads are variegated or splotched with yellow)—O. arbuscula, O. macrocentra (very striking with its coloration in the pads, its dark, white tipped spines, and its showy yellow flowers with red center), O. microdasys (with its velvety looking yellow glochids), O. basilaris (with its circle of brilliant magenta blossoms), O. santa-rita (whose coloring raises it to a position as a foliage plant, though without leaves), O. subulata (with its striking persistent leaves), O. leptocaulis (with its bright, proliferous fruits)—these all prove the attraction of the Opuntia as likely plants whose selection will not be regretted.

In such a garden the larger growing Ferocactus should find representation. In addition to the Visnaga of the Southwest, the beautiful Echinocactus grusoni should be a choice, with its yellow spines, which make of it a veritable ball of gold. The columnar Cacti, wonderful as they are, are much more limited as to climatic conditions, and their use should be decided accordingly.

Usually in a garden of this character, variety may be added through the interplanting with the Cacti of other succulents, such as Agaves, Aloes, Dasylirions, and others.

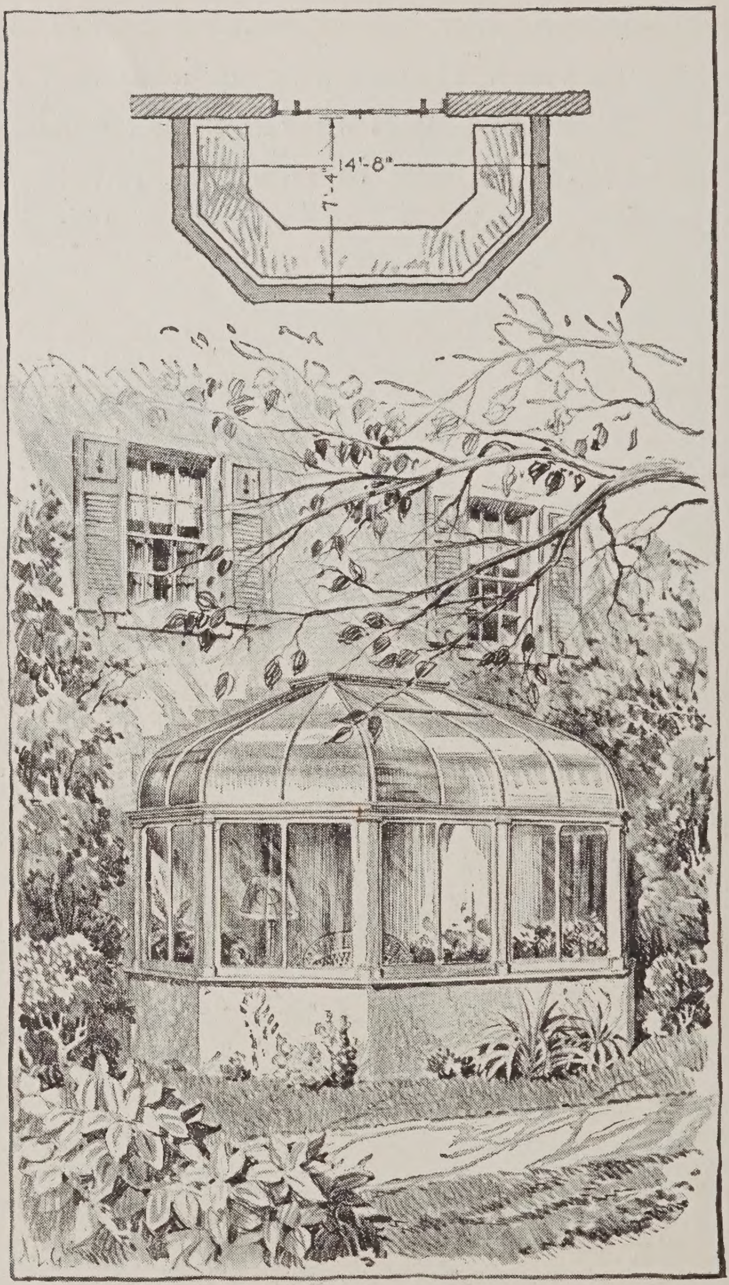
In the lee of the protection offered by the larger growths may be grouped the smaller plants, which will find a place as the design is planned, such as Echinocactus, Echinocereus, Coryphantha and Neomammillaria.

The rock garden presents a more difficult problem but one which will prove a great source of satisfaction when worked out successfully. The selection will probably be

Cactus garden at Santa Maria Inn, Santa Maria, Cal.

similar to that made for the larger garden using, in accordance with the space at command, less of the larger growing and more of the smaller varieties. Care must be used to place the Cacti in relation to other plants that often find their place in the rock garden, so that proper watering may be done with due adjustment to

Cactus and succulent garden with a note from the Orient

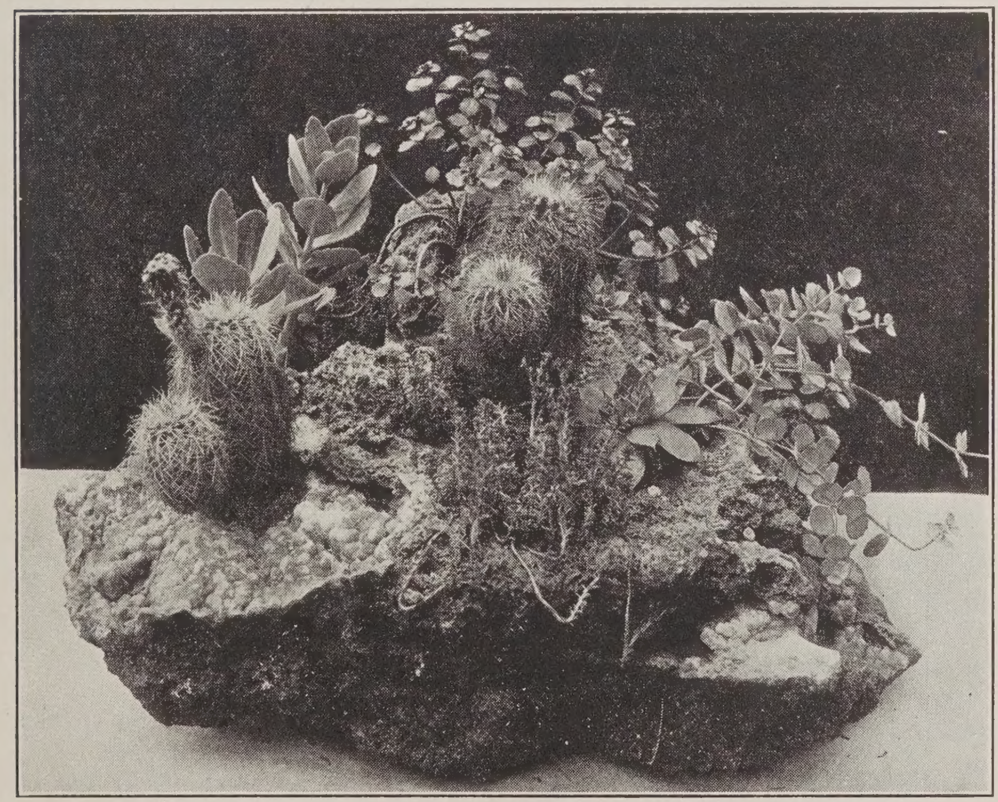


An ideal conservatory for growing Cactus plants in the East and North, moderate in cost and the heating of which can be taken care of from the house system

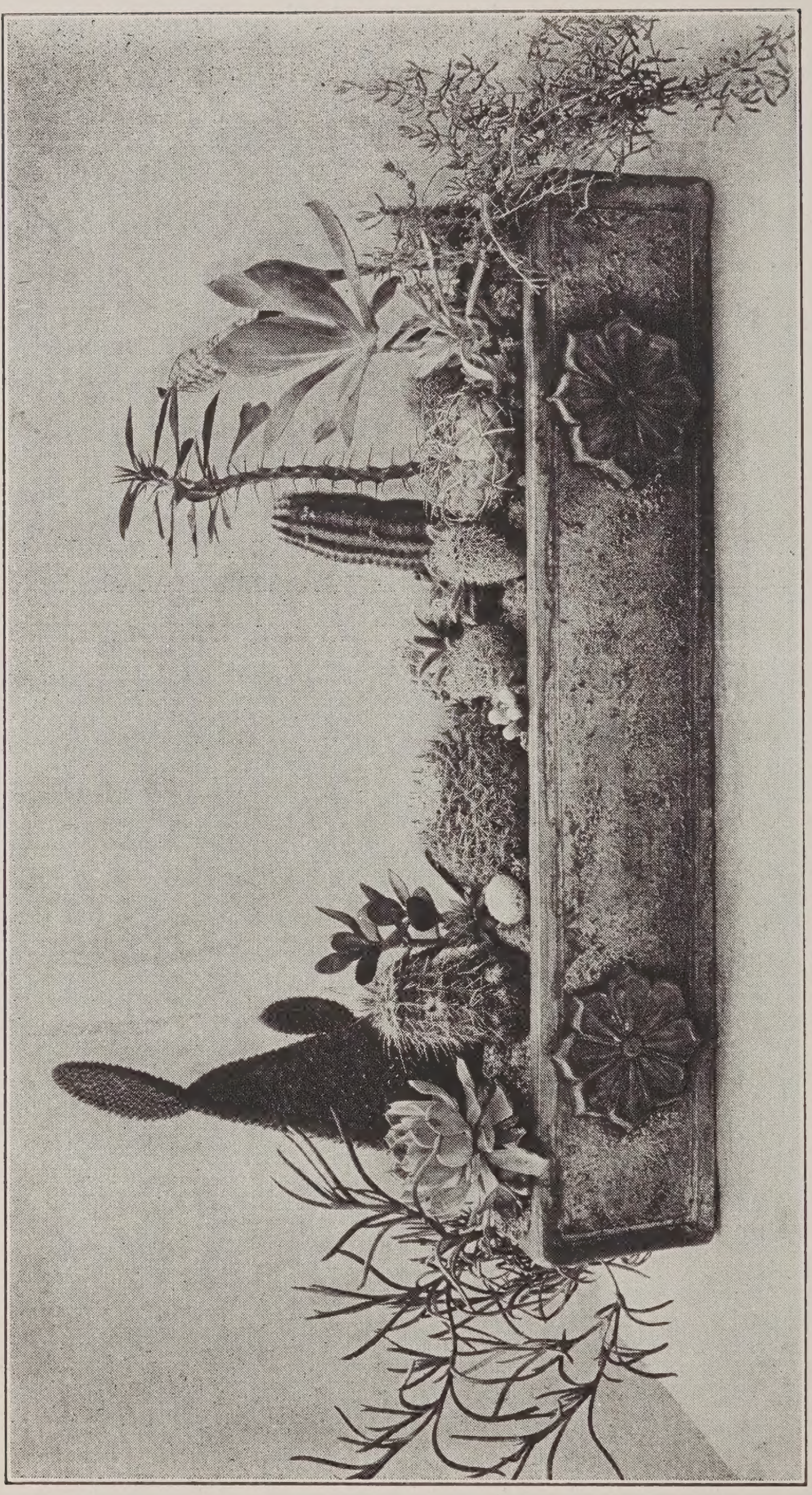
Courtesy Lord & Burnham Co.

the needs of each. Also, in placing them, one must consider the conditions that increasing growth may bring, and not endanger the success of the decorative scheme by making possible the overshadowing or crowding out of some choice specimen by the ranker growth of its neighbor. In the construction of the rock garden the first consideration to govern its building must be that of adequate drainage, for this is the greatest essential in the cultivation of the Cactus. The importance of this detail cannot be too emphatically insisted upon.

In a patio, where they form a particularly happy choice, accentuating the modified Spanish architecture as



A ready made collection of interesting Cactus and succulent plants already established in a piece of tufa rock. Can be conveniently handled and used in the construction or embellishment of a rockery, a window ledge, etc.



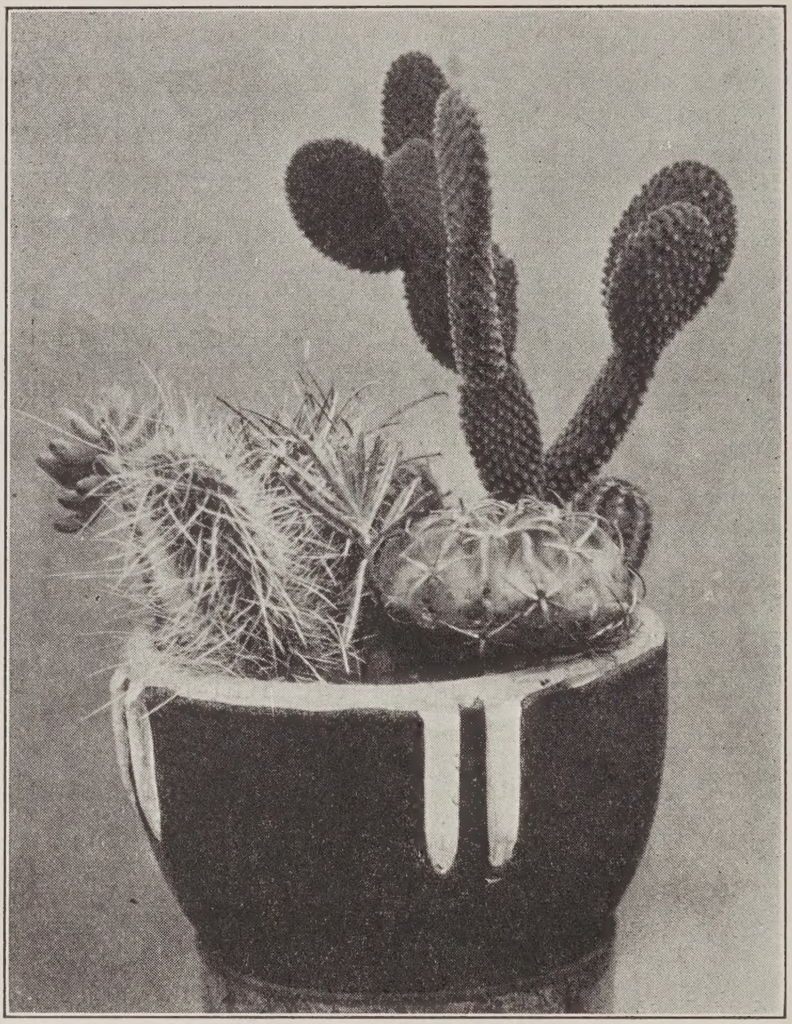
Showing an attractive arrangement of Cactus and succulent plants for a window garden nothing else can, an Opuntia against the wall, a columnar Cactus to mark the entrance, a tubbed Agave, and a group of the smaller growing Cacti, either bedded or in ornamental pots, perhaps the latter carrying out a color scheme, would constitute a happy selection.

Among the smaller growing ones for this purpose, and also suitable for the window garden, would be some of the shorter growing Echinocacti, Echinocerei, Coryphanthae, Neomammillarias; including perhaps as well the Echinopsis, the South American interpretation of our Echinocereus.

The window garden may include one of the night-blooming varieties, or the beautiful Heliocereus, or the Crab or Christmas Cactus, or the Rat-tail—awful name for a beautiful plant.

For the single plant, ah! let us choose with care. A single Mammillaria with its persistent bright fruits an Echinocereus, perhaps of the pectinate type, with its close spines which give it such a trim look, as the Ec. rigidissimus with its bands of bright colors, or the Ec. reichenbachi with its lacy white spines and its lovely flower; or perhaps the Ec. conoideus with its severe look and its artificial appearing flower; or perhaps an Echinopsis which, from its trig little globose self, sends forth the flower that is a miracle. All in all, it is a difficult choice and must be governed by individual taste.

Any one of these Cacti will fill a want no other plant can supply; for it will give opportunity to the office desk to sport a decorative note which could not be met by other plants where conditions mean neglect over the weekend. In an apartment, where the owner is absent



An interesting composition is obtained by the use of the higher growing Opuntia microdasys as a foil for the Echinocactus and Echinocereus in the foreground

much of the time, it will give that satisfaction to be had from a growing thing, with no qualm of conscience or feeling that our lovely friend is suffering from enforced neglect.

Another form in which these plants may be used is that of the bowl or dish garden, in which several specimens are included in a single container, thus giving to our restricted choice more latitude and the added interest of variety. Several illustrations, suggesting types of this class, are given in these pages and will serve as illustration of the possibilities opened in this simple way to those who have neither room nor time for more extended culture.

One word of caution in the interest of the plant: make sure, even in the case of decorative pots, that there is provided some means of adequate drainage.

WHEN PROTECTION IS REQUIRED

Notwithstanding the fact that some Cacti are found growing under every climatic condition, from the Tropics to the Northern boundaries of our country, and in desert, mountain and jungle, few of them are hardy in cold climates. If grown there they must have the protection that is accorded other plants similarly assembled from such widely varying sources. The tropical plants must have in a cold climate the protection afforded by greenhouse conditions. In many instances, potted plants, housed in the Winter, may be set in the ground without disturbing them during the Summer; while many of the plants of the temperate region, accustomed to more climatic variation, may be amply protected in the open by using proper precautions. The same exercise of care and intelligent selection that is used in the choice of other plants, when location, opportunity to afford proper protection, and other natural problems are considered, will afford a sufficient guide in this case.

Where and how shall we obtain our plants? They may be raised from seed, collected (by ourselves or others), or propagated from offshoots or cuttings.

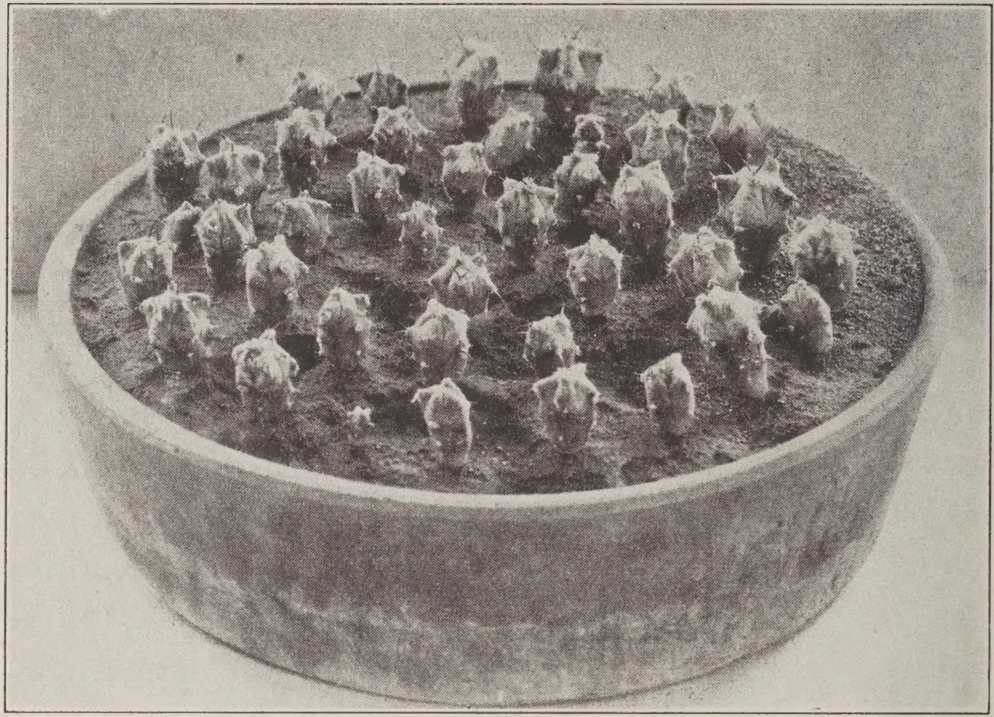
Cactus and succulent plants in a double dish. This is especially to be commended, as through the use of a double dish ample drainage may be provided

The first method is simple, in theory, at least. There seem to be as many methods of procedure as there are people who promulgate them, but they will all be found to reduce to a few fundamental essentials, and these are pretty well necessary features of all Cactus culture. One must have clean pots or seed pans, adequate drainage and a light loose soil that will not pack easily (about half sharp sand and half rather light rich soil without manure content). Some experts recommend the sterilization of the soil by baking and, if not absolutely necessary, it is erring on the safe side to take this precaution.

Fill the pot at least one-third full of broken crock, charcoal or other material to insure drainage; then add the soil, damp but never wet; scatter seed evenly on top but not too closely, else the tiny seed will crowd when they germinate; sprinkle a little dirt over the top and cover with a light layer of gravel. This not only helps keep the soil from drying out, which must not at any time occur, but also protects the seed from washing when sprinkled, affording the needed protection to the minute, watery little things that are the seedling plants, preventing change in temperature and consequent damping off. If this is observed, a fungicide such as Semesan should be used. The plants should be left as long as possible before transplanting.

PLANTS FROM SEED

It is claimed that plants from seed are more perfect and more beautiful than those collected, which is entirely to be believed. But there are two elements which make, to many, some other method of propagation preferable. First, the infinite care, the unceasing watchfulness that must be given these tiny seedlings, which, in this busy age, many of us have not the time necessary to give to them to insure success. The second is the almost universally slow growth made by the young plants. If these two factors are weighed, and the delight in watching the growth of the tiny seed into the lovely plant is sufficient



Seed pan of Echinocactus ingens

to overcome our proneness to neglect them in the press of other duties, and the impatience which their slow growth tends to produce, there will be found ample reward.

Collected Plants

If we are busy people and impatient of soul, we will likely collect the plants ourselves or purchase from those who do collect. Either way they may come to us as plants or as cuttings.

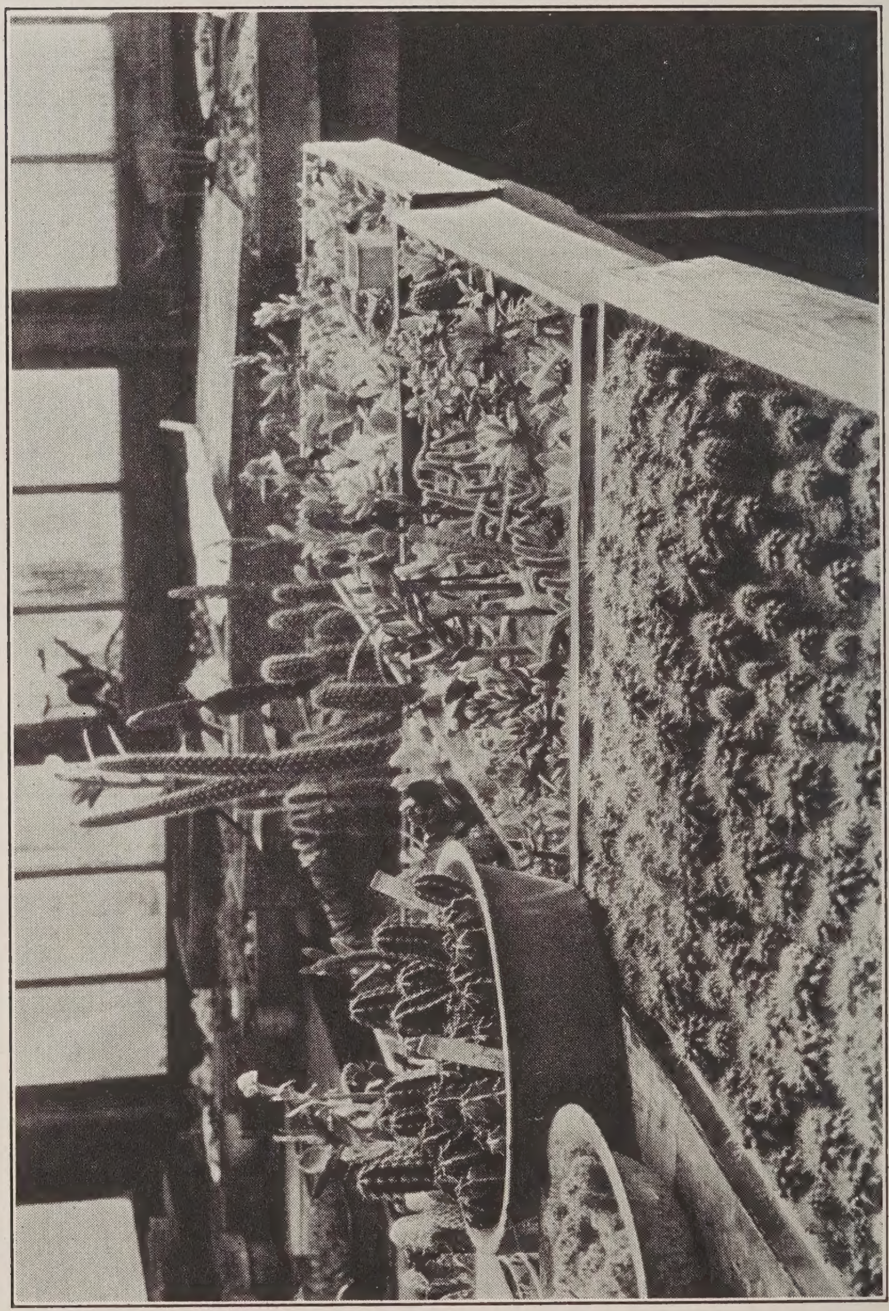
Plants collected by ourselves or others should be carefully looked over. Any damaged or bruised roots should be trimmed, as otherwise they may prove the seat of infection and decay ensue. Good clean pots, good drainage and a light soil are imperative. Make soil moist but not wet; water sparingly until well established.

CUTTINGS AND THEIR CARE

Cuttings should, as a general rule, be left exposed a few days to callous, otherwise they are subject to rot. If planted in the pot in which they are to remain, prepare as for a plant, but make a little hole or pocket and fill with propagating sand and powdered charcoal in which the cutting should be set. Water very sparingly. Some of the more succulent or watery ones require care, as they rot easily. The writer, after the loss of a particularly interesting specimen from this cause, profited by the advice given in the *Cactus Journal* for the rooting of Euphorbias, and was converted to the idea of "crutching" these delicate specimens. The ground being prepared as above, the cuttings were placed very lightly in the soil (not over a quarter of an inch), and tied to sticks thrust deeply into the soil, thus being supported in position. The device proved perfectly successful. If cuttings are to be rooted and subsequently potted, fill boxes in which provision has been made for thorough drainage, with sand and powdered charcoal, slightly damp; insert the cuttings, watering very lightly, if at all, until roots form. Let the roots be well developed before transplanting. Offshoots should be treated for propagation as cuttings.

THE SELECTION OF A PERMANENT LOCATION

Having our plants well under way, in one form or another, we must prepare a place for their permanent location. With Cactus culture, the all important, first and last consideration, is adequate drainage. This applies as well to their culture in the field, in pots, or however



SEEDLINGS AND CUTTINGS

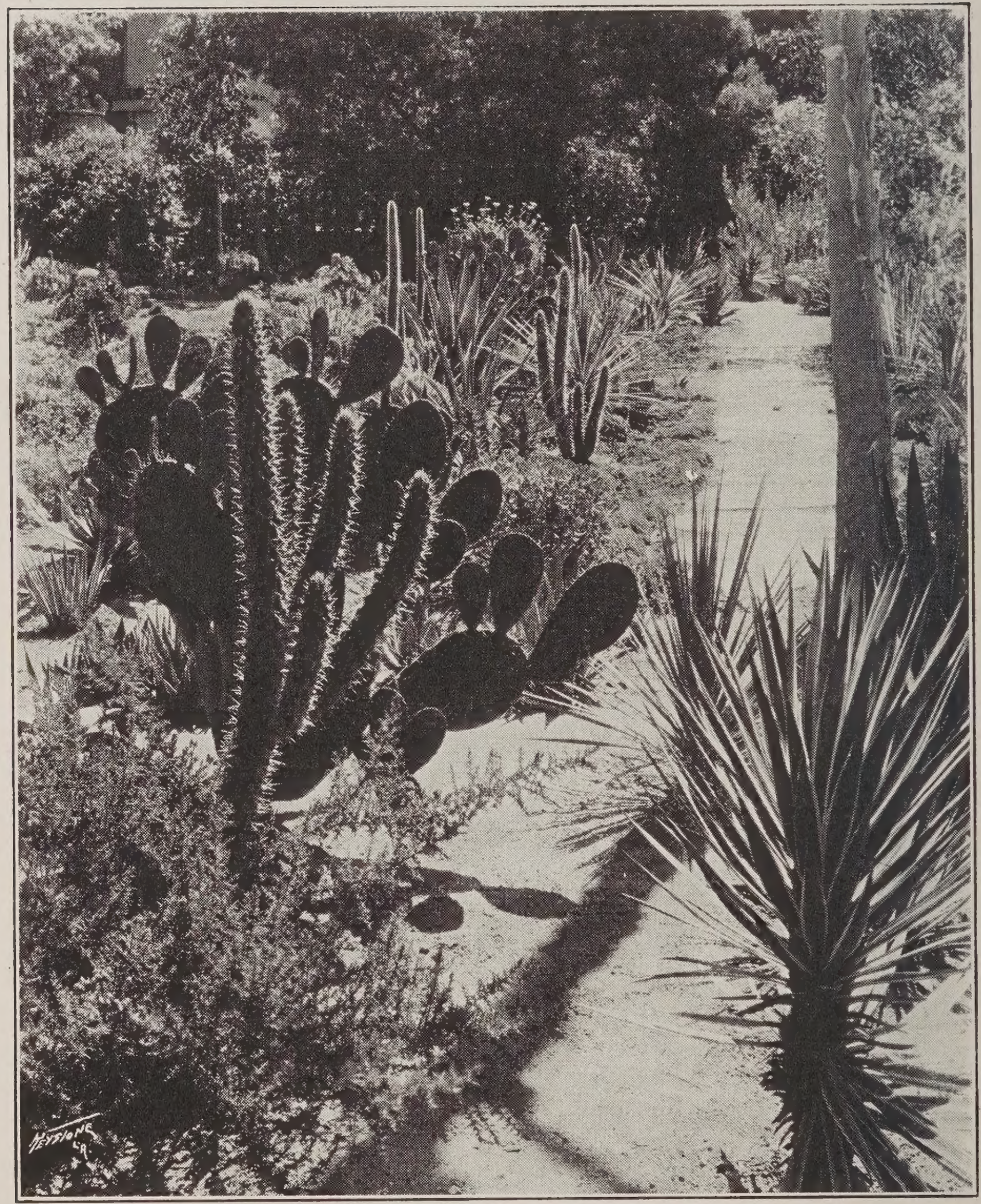
arranged. Their roots must not be in damp, soggy soil. The greatest menace to the Cactus in cultivation is rot; if too wet or not properly drained, in a day the plant may be gone. Whether or not a plant affected by rot can be saved depends upon its condition. If the rot is far advanced, no, it would be best to destroy it. If, however, it is only affected in the lower portion, it may be rescued by the radical cutting off of all affected parts and treating the stem from which such amputations have been made as a cutting.

To prepare properly for drainage in the case of pot plants, fill the pot from one-fourth to one-third full of broken pots and charcoal and make the soil porous by the use of sand and fine gravel well mixed. In the case of most desert plants, the addition of a little slacked lime will be beneficial. In the case of the tropical plants a slightly richer soil, with the addition of a little fertilizer and leaf mold, will not come amiss.

If the plants are to have a place in the open ground they should be given practically the same conditions. A sloping location is preferable; otherwise the beds should be built with a slight slope to insure the carrying off of the water. Give a light soil with plenty of sand, and cover lightly with coarse gravel. A substratum of broken pottery, small stones, broken plaster, charcoal, whatever material is most convenient, should be provided.

THE WATERING PROBLEM

Although the nature of the Cacti is to store their water supply, and they can live some time without a drink, nevertheless they do occasionally require it.


Keystone
L.A.

Another view of the Cactus garden at Santa Maria Inn, Santa Maria, Cal.
(See also page 114)

Most is needed in their blossoming and growing seasons; the evidence of the new growth is unmistakable.

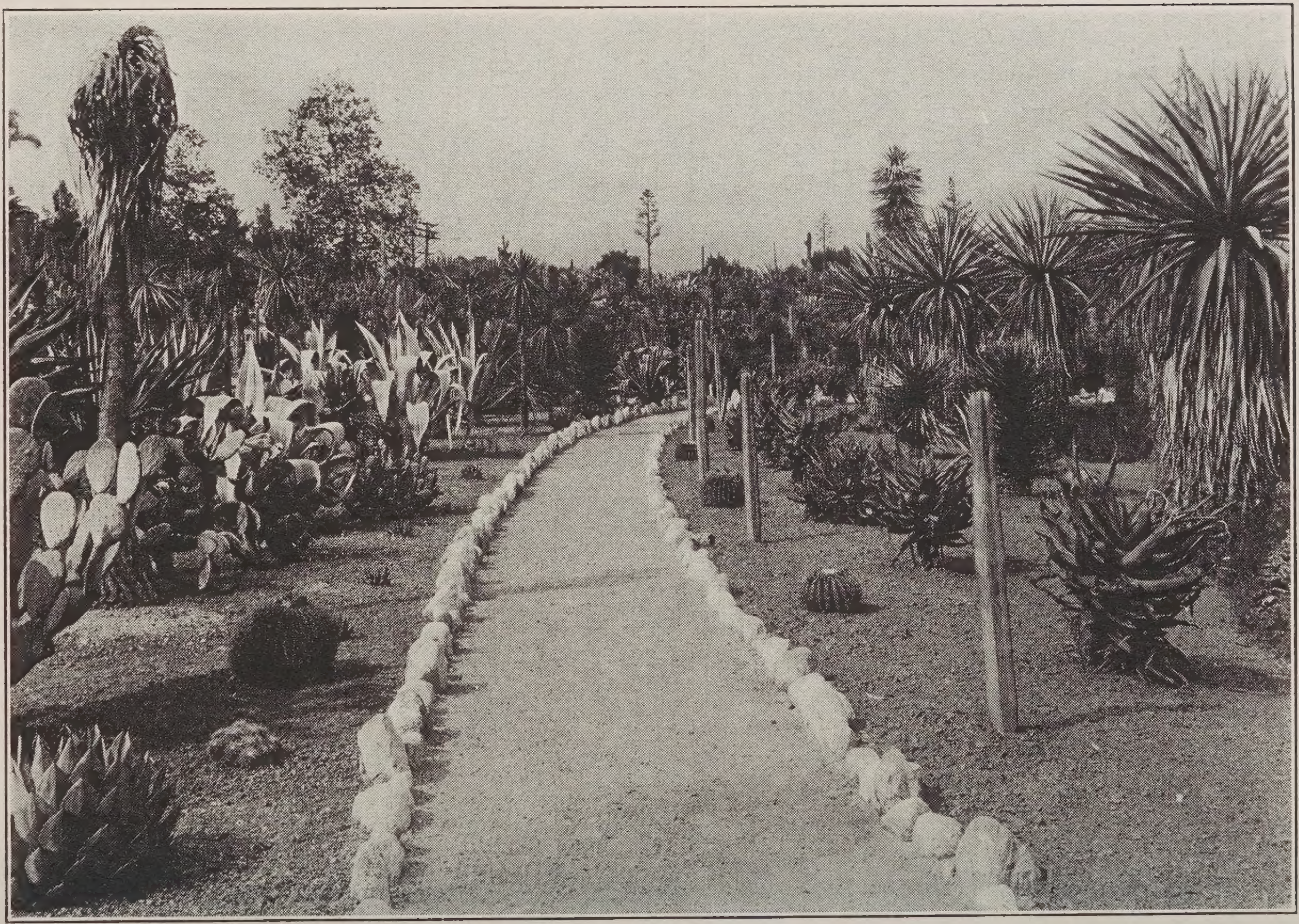
Our own common sense tells us that, although a plant in its native habitat of desert dryness and arid atmosphere, can exist for almost an indefinite time, because of its widespread root system which takes up any moisture available, deep down in the earth and for many feet about it, nevertheless, the same plant in a small pot, with its delicate roots perhaps close to the porous substance of the container, dried out by sun and wind, will require more frequent watering than in the ground where its native conditions can be better simulated. In the dry season, or the warm growing season, water the plants with the same intelligent care given to other plants; never let the roots be continuously wet or rot will result. After the period of growth is over, withhold the water, giving it perhaps only once a week or even less frequently.

It is well also to spray them occasionally to keep them free of dust and clean, this to be done at such a time as there is no danger of the water settling in the crown of the plant, or of its becoming scalded in the sun.

REPOTTING AND SHADING

They do not require frequent repotting. The usual practice is to use small pots, comparatively. This is to force the blossoming. If they seem unduly crowded, or the plants do not appear to be in good condition, they may be repotted. After repotting, water sparingly until reestablished.

Partial shade will usually prove grateful to the Cactus plant; at least place them where they will not be continuously subjected to the glaring sun.



Cactus planting at the Huntington Botanical Garden, San Marino, near Pasadena, Cal.
Courtesy of Wm. Hertrich, Superintendent

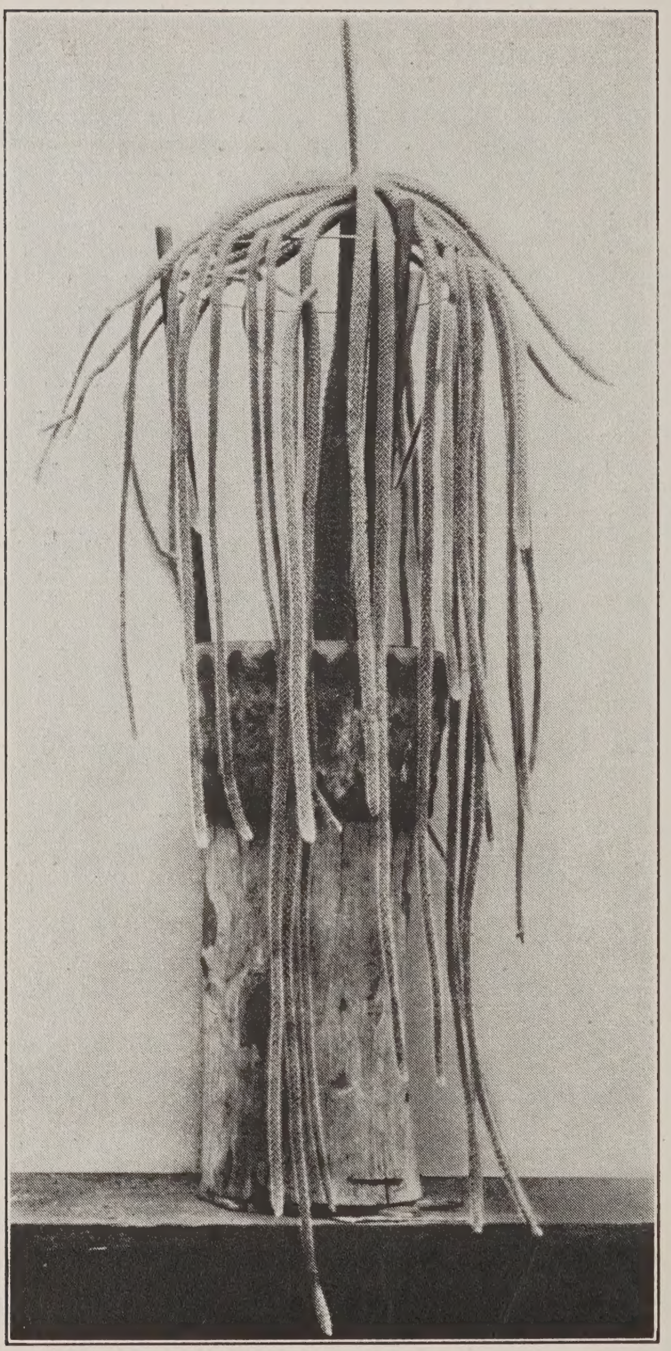
HOW TO HANDLE THE PLANTS

The apparent difficulty of handling the prickly plants is sometimes a deterent to the mind of the admirer and would be owner. The difficulty is in reality not as great as it appears; yet there is certainly room for the inventive mind to fashion some special implements for the purpose of easily handling the choice specimens with their bristling armor, without discomfort to the culturist or injury to the plants. Clamps of various kinds are improvised; a small tong bought at the "five and ten," whose avowed purpose is the handling of hot potatoes, etc., proved itself most useful in the handling of small plants. The best implement of "first aid" to the Cactus fan is a pair of tweezers with which the offending spine may be plucked out.

HYBRIDIZING AND GRAFTING

To the interested culturist, the study of the Cactus soon becomes an absorbing one. Sooner or later he does more or less experimentation; it may be that his taste will lead him in the way of hybridizing, and the results may prove of great interest and bring added beauty or utility, from whatever angle his desire may lead him to approach the work. Development of fruit, or some utilitarian result, may be his aim; or to seek for new beauty through hybridization by striving to unite the good points of the parents.

Even more sure to be the subject of experimentation by the novice as well as the expert horticulturist is the process of grafting.



APOROCACTUS (Syn. cereus) FLAGELLIFORMIS
(Rat-tail Cactus)
Two years from scion; three feet long

The objects to be attained by grafting are varied: a weak or delicate plant may gain added vigor by grafting it upon another of more robust growth; a slow growing plant may be improved by grafting it upon a species of more rapid growth; sometimes a plant susceptible to rot is raised above the danger line by grafting; again a pendent plant may be rendered more attractive by grafting it upon a standard. A cristate may be placed in a position to show itself to better advantage or to advance its growth more rapidly. Then again grafting may be resorted to in the endeavor to produce curious growths or freaks.

The method of grafting Cacti is simple, and may be attempted by a careful worker with fairly uniform success.

The scion is cut in wedge shape, inserted in a slit in the stem, caught in place with a spine, perhaps wound with a little twine as a protection, and in a few days they knit together. This is the modus operandi in theory; of course, in practice, care is advisable. In grafting a globose specimen, either the base may be cut flat and attached to a cylindrical stem approximating it in size, the latter being cut flat on top; or it may be cut wedge-shaped and a corresponding notch cut in the stem to which it is to be attached. Secure with two or three spines and tie in place. Some varieties of cylindrical Cerei are often used as stock to which the scion is attached; also Pereskias and some varieties of Opuntia.

UNFAILING INTEREST IN THEIR STUDY

Whether the motive be the enjoyment of a single Cactus, or a collection, experimentation with their pos-

CEREUS PERUVIANUS
in bloom in a private garden, Covina, Cal.

sibilities, studies of the many unsolved riddles they still present or whatever phase of their culture may be of interest to us, it may be assured that they hold for the culturist, the enthusiast, and the student alike a store of unfailing interest.

INSECT TROUBLES

In common with all plant life, Cacti are subject to some offending insect pests whose advent should be watched for and prompt measures taken for their suppression. The most frequent offenders are scale, mealy bug, cochineal and aphis.

There is a scale which seems especially fond of certain Opuntias; some varieties of Opuntia are infested with Cochineal, while others remain untouched. Mealy bug is a meance to all. The presence of ants about a plant should be closely watched and investigated. They are staunch purveyors to and supporters of the mealy bug, scale and aphis, and their presence will warrant investigation. It is well to keep Antrol or some ant poison among the plants.

A treatment for scale which proves effective but sometimes destroys the beauty of the plant by spoiling the color of the spines is Volck or a similar oil emulsion; often it seems almost as bad to spoil the beauty of the plant as to lose it. Whale oil soap suds sprayed on is quite effective and is less detrimental to the beauty of the plant. This may also be used with the addition of a small amount of Volck. In the case of small or choice plants, slightly infected, this mixture may be applied with a brush; it will prove satisfactory and will not injure the appearance of the plant. If plants are seriously infected repeat at intervals of a few days to get rid of all newly hatched specimens. Eternal vigilance and a prompt application of the remedy will avoid much grief. A subsequent spray of clear water will help the appearance of the plant materially. Nicotine in spray will prove a cure for the life sucking aphis. These are found many times about the root; so if your plant is not looking well, and especially if you see ants about it, investigate.

CHAPTER VI

Questions and Answers

1. What is a succulent?

Succulent means juicy, and in botany is applied to such plants as have thick or fleshy leaves or stems, or other means of storing moisture, making them drought resistant.

2. What is a Cactus?

A Cactus is a succulent, of varying form. Cacti are usually leafless (except the Pereskias) or with leaves soon falling. They are usually armed with spines springing from the areoles and generally bear many petaled, showy flowers. The ovary is one celled, hence, fruit has no division between seed.

3. What other succulents, perhaps because often grown with Cacti, are frequently confused with them in common parlance?

Aloes, Yuccas, Nolinas, Dasylirions, and others of the Lily family; the Agave which is an Amaryllis; Stapelias, Euphorbias and many others.

4. What is the Cactus botanically?

"The old and Linnean name for the group of plants, considered a single genus, which now forms the order Cactaceae" (Century Dictionary). It is classified by Britton and Rose, whom we take as our standard, as follows (genera not finding representation within our limits, omitted, such omission however apparent):

Order—Cactales
Family—Cactaceae
Tribes—Pereskieae, Opuntieae and Cereeae

The members of the first are entirely dwellers within the tropics; they have leaves, spines, some of them edible fruit, as the Barbadoes Gooseberry, and are known in cultivation and used quite widely as grafting stock.

Of the Opuntieae, the genus Opuntia is the only one found native in the United States.

The third tribe, the Cereeae, is divided by their classification into eight sub-tribes. Of these there are represented in the United States by some genera (1) Cereanae, (2) Hylocereanae, (3) Echinocereanae, (4) Echinocactanae, (6) Coryphanthanae, (8) Rhipsalidanae.

(1) Cereanae. Of the 36 genera we have native, Cephalocereus represented by two species in Florida; Bergerocactus, one species in Southern California only; Wilcoxia, one species in Texas and Arizona; Acanthocereus, one species only in Florida and Texas; Harrisia in Florida; Carnegiea, monotypic, Arizona and California; Lophocereus, one species only in Arizona.

(2) Hylocereanae has one representative only and that doubtful, Selenicereus spinulosus, perhaps in Texas.

(3) Echinocereanae, (4) Echinocactanae and (6) Coryphanthanae are well represented in point of number of species, though by no means do all the genera find representation. In fact only one genus of No. 3 is found, namely Echinocereus. Of No. 4, twelve genera of the 28 are found; and of No. 6, nine of the 14 genera listed are represented. A list of these will be found on page 159, with distribution in United States noted.

(8) Rhipsalidanae is represented by one species only, found in Florida.

5. How many species of Cacti are there?

The answer to this must be a little uncertain. Britton and Rose list between 1200 and 1300. Many others are listed by them as doubtful or uncertain in classification; many hybrids exist in trade, but are not botanically recognized. Differences in classification arise, and thus so many variations in listings result that the answer must be indefinite.

6. What kinds predominate in point of number of species?

Of the three tribes, the third, the Cereanae, with its many sub-subdivisions; in a single genus, the Opuntia with about 250 species; the Neomammillaria, about 150 species.

7. What states have the most varieties of Cactus?

Probably, in order named: Texas, Arizona, New Mexico, Southern Colorado, Southern California.

8. What is their distribution in the United States?

See page 3.

9. Which has the widest distribution?

The Opuntia.

10. What is considered as "Cactus country" in the United States; that is in what sections are they so abundant as to be at least a distinct feature of the vegetation in certain localities?

The Southwest, including Texas, New Mexico, Arizona, Southern Colorado and Southern California, also some parts of Florida.

11. Are Cacti desert plants?

Most of those growing in the United States are desert plants. Exceptions to this, however, are some species growing in Florida. Outside of this country, there are many native to tropical jungles, sometimes growing with and under similar conditions to the orchid.

12. Do Cacti have leaves?

Leaves are usually absent or fall very soon, so that they are rarely seen. (An exception to this is the Pereskia tribe, but none of them are native.) However, there are exceptions to the rule. An Opuntia with persistent leaves is the O. subulata, illustrated on page 98. It is also an alien, hailing from South America. It is often found in cultivation.

13. What is an areole?

An areole is the little cushion from which spring the spines and glochids.

14. What is a glochid?

A glochid is a tiny barbed bristle, often found growing in the areoles of Opuntias in the form of little bunches of these tiny spicules.

15. What is the perianth and perianth segment?

The perianth is the floral envelope, surrounding the reproductive organs of the flower. It is composed of the petals and the sepals, which in the flowers of the Cactus are sometimes scarcely distinguishable; hence, they are all alluded to as "perianth segments."

16. What is the distinguishing mark of the Opuntia?

Its distinctly jointed stems.

17. What is a Platyopuntia?

An Opuntia with flat joints—the Prickly Pear.

18. What is a Cylindropuntia?

An Opuntia with cylindrical joints—the Cholla.

19. Are the Opuntias of value economically?

The Platyopuntia is valuable for its fruits (see page 8); both the Prickly Pear and the Cholla are used as feed for cattle (see page 11).

20. What precaution is taken in feeding the Cholla to stock?

See page 13.

21. Why is the cultivation of the Opuntia discouraged by the Bureau of Agriculture?

See page 12.

22. What is Burbank's spineless cactus?

See page 11.

23. What is the Tuna?

See page 8.

24. What is meant by the Mission Cactus?

The padres, when coming from Mexico (Baja California), to establish missions in what is now California, brought there into cultivation, the Tuna and the Indian Fig. They are still to be found growing about the missions or the ruins of the missions, where they once formed a valuable article of food.

25. Did they serve any other purpose to the missions?

Yes, they formed quickly growing barricades, serving as a means of defense.

26. Are there other records of their use for this purpose?

They were often so used. Also there is a tradition that they played their part in assuring the possession of California to the United States. At the battle of San Pasqual, the Gringos, under Kearney, were afforded protection by the thickets of the Prickly Pear against the attacks of the Spaniards whose spirited horses refused to attempt the spiney barriers.

27. What is the Jumping Cactus?

Some of the Chollas are known by this name, because of the fact that their easily detached joints appear to jump and cling to the passerby.

28. What is the Cane Cactus?

This is a name applied to several kinds of Cholla, because after the pulp has been removed, the stems showing the peculiar reticulations of fiber and capable of taking a polish are made into canes and sold in curio shops.

29. What is the Grizzly Bear Cactus?

The Opuntia erinacea (O. ursina) whose long, bristle-like spines make it a curious one in demand for small collections.

30. What Opuntias are suited for pot culture or for small space?

See pages 17, 19.

31. What large growing ones are most desirable in cultivation?

See page 113.

32. Are Opuntias available in all parts of the country, or suitable for cultivation in all climates?

The Opuntia is the most widely distributed of all Cacti in North America and the "native son" is available in almost every section, from Nova Scotia to Florida and throughout the Middle West and on the Pacific Coast from British Columbia South. In addition to those found growing in the different sections, various others may be cultivated by taking proper precautions for their protection from climatic conditions to which they are not suited, as with any other plants.

In *Meehan's Monthly*, Philadelphia (1891–1892), there is an interesting item as to the adjustment of Cacti, native to a cold climate, to the conditions which they meet. The subject under consideration is the Platyopuntia of Nova Scotia: "The joints are charged with moisture which, under the ordinary law of liquids, should expand under a temperature below the freezing point. But as soon as this degree is reached, the juice seems to diminish and the joint shrivels and falls to the ground. It is not supposable that the sap freezes but, if it did, there would be abundant room for expansion without rupturing the outer coating at least."

33. What is the meaning of the word Cereus?

Waxy, hence the Torch Cactus.

34. What columnar Cerei are found in the United States?

Carnegiea gigantea, Lophocereus schotti and Lemaireocereus thurberi in Arizona; Cephalocereus keyensis and C. deeringi in Florida.

35. What is the Cardón?

Cardón is the general name used by the people of Mexico for the treelike, columnar Cacti, apparently without discrimination as to species.

36. From what Cactus do the Indians make drinking vessels and how?

The Sahuaro (Carnegiea gigantea). The Sahuaro woodpecker, in preparing its nest in the Giant Cactus, makes an excavation, which heals over, forming a thick skin over the hollowed part. These nests are used as noted.

37. What is known as the Rat-tail Cactus?

The Aporocactus flagelliformis. This is often seen in cultivation with its bright blossoms; it is usually grafted upon another stock.

38. What is known as the Old Man Cactus?

The Cephalocereus senilis. This is covered with long white hairs, parted on the crown; whence its name.

39. What is the Pitahaya or Pitaya?

This is the name by which a number of species of the Cereus, bearing edible fruit, are known. It is a name applied with little discrimination as to species. Sometimes an accompanying adjective will identify a particular species, as Pitaya dulce, which is the name by which the Lemaireocereus thurberi is known, in allusion to its sweeter fruits.

40. Is there economic value attached to the Cerei?

See page 42. There are now being conducted, in various ways, experiments leading to the development of marketable fruits.

41. What is the Grape Cactus?

The Myrtillocactus, so called because of its small fruits which grow several together and is eaten both in the raw state and dried, like raisins. No one of these is found North of the Mexican border.

42. What is known as the Sweet Potato Cactus?

Peniocereus greggi, the nightblooming Cactus of Arizona.

43. What is the Crab or Christmas Cactus?

Zygocactus truncatus (Epiphyllum truncatum).

44. What Cacti are known as Night Blooming Cereus?

Hylocereus undatus (Cereus triangularis); Selenicereus grandiflorus, S. macdonaldiae, Harrisia fragrans and many others. There are many hybrids.

45. What is the Strawberry Cactus, so called?

This name is applied indiscriminately and in different localities to different plants, species of both Echinocereus and Coryphantha being included under the name. It originates in the fact that the small fruits are edible, usually red in color, and in certain cases with somewhat of a strawberry flavor.

46. What is the Fishhook Cactus?

This is another of those names which, like the Strawberry Cactus, should never be used, because of its indefinite description. There are many widely different plants to which this same name is applied, and it would be impossible to clearly define what plant was meant by the term.

47. What is known as the Plains Cactus?

The Pediocactus simpsoni. It is widely distributed throughout the Middle West.

48. What is the so called Leopard Cactus?

It is not a Cactus; it is a Stapelia.

49. What is known as the Well of the Desert?

The Barrel Cactus, the Visnaga (Bisnaga), under which term are included several of the larger species of Ferocactus.

50. Why are they thus known?

See page 64.

51. What Cactus is utilized as a cooking utensil?

The Barrel Cactus. See page 64.

52. What is Cactus candy and of what Cactus is it made?

It is the flesh of the Barrel Cactus or Visnaga, cut in strips, preserved in syrup and dried.

53. What is the Living Rock?

The Ariocarpus fissuratus which, growing in gravel and broken stone, is not at first glance discernible among the rocks which surround it.

54. What is the Peyote?

See page 60.

55. What is known as the String Cactus?

Rhipsalis cassutha, which, growing pendent from the branches of trees, trail in long masses of slender stems.

56. What is known as the Rainbow Cactus?

Usually, when this term is used, there is meant the Echinocereus rigidissimus, so called from the rings of color about the body through the variation in spine coloration. Also, there is sometimes known by this term the Heliocereus speciosus, or a hybrid, which shows such dazzling hues in the flowers; these are of the most brilliant carmine red, running into shimmering mauves, and the whole iridescent, changing with every slightest movement.

57. What is the Echinopsis?

This is the South American Cactus, corresponding to the Echinocereus of our own country. They are very desirable in cultivation, are small, easily cared for, and bloom freely, bearing blossoms that fairly make one hold one's breath as they develop. The flowers are almost fairylike in their delicate beauty.

58. What Cacti have edible fruits?

Opuntias, the Tuna and Indian Fig; some of the Columnar Cerei (Pitayas); some of the Echinocerei, the

Strawberry Cactus; Neomammillaria, Chilitos or Little Chilis.

59. Are Cacti of use medicinally?

A cardiac remedy (used as a stimulant), is derived from some species. The alkaloids from Lophophora williamsi are used as medicines in lung trouble, also in angina pectoris. The lobes of Platyopuntia are used as a poultice. The juice of some species of Coryphanthas are used to heal sores, etc.

60. Of what states is the Cactus the state flower?

Arizona, the Carnegiea gigantea, or Sahuaro, the Giant Cactus of Arizona. New Mexico, the Echinocereus.

61. To what uses have the spines of the Cacti been put?

The Indians made use of them in many ways: as a means of fastening a seam; in making of fishhooks; for tattooing, etc. The Mexican curio shops have for sale toothpicks in which the spines of Echinocactus ingens are utilized. They may on occasion substitute very satisfactorily for Victrola needles; they produce a very soft tone but soon wear out.

62. Are the spines of the Cactus poisonous?

No. If imbedded in the flesh they are naturally ejected, just as a splinter is, but they are not in themselves poisonous.

63. How are plants provided with sufficient moisture in the desert?

By their extended root system. Coville, in *Desert Plants as a Source of Drinking Water*, states that Opuntia echinocarpa, with a height of 48 cm. (about 19 inches) has a root system extending over 5.5 meters, or 18 feet in diameter; thus it draws moisture from quite an area. This would give us a key to a feature of desert vegetation;

namely, that nowhere do we find it clustered, but rather with the plants spaced, as it were. This is very noticeable in a plant not a Cactus, but subject to the same conditions, the desert Greasewood or Creasote Bush (Larrea tridentata DC) which seems to space itself as exactly as if measured and set out. This is especially one that attracts attention because of its glossy, green foliage. It would seem to answer, in a way, the much disputed question of how to water in cultivation; if closely grouped, give them more than if they have plenty of room.

64. Why spines?

As a protection, in two ways—a protection against too much evaporation and also against marauders. If without armament, in a desert environment, dry and arid, and with inadequate food supply for animals and birds, they would soon be exterminated, forming as they would, a tasty tidbit for the hungry and, more important, providing refreshment for the thirsty.

65. Does the armament of plants removed from desert conditions persist?

It is an observed fact that the spines of Cacti with fierce protective armament grow soft when transferred to surroundings where food and drink for beast and bird abound. The armament insures the preservation of the species, and when the necessity for this protection is removed, the armament is dropped. If continued, it would mean too abundant increase.

66. How is the conservation of water insured in the Cactus?

By the leathery skin; by the mucilaginous quality of its juices; by its formation, which insures a contraction of surface area as the stored water is drawn upon, with consequent decrease of evaporation surface.

67. Are the Cacti protected from destruction in any other way than by spine armament?

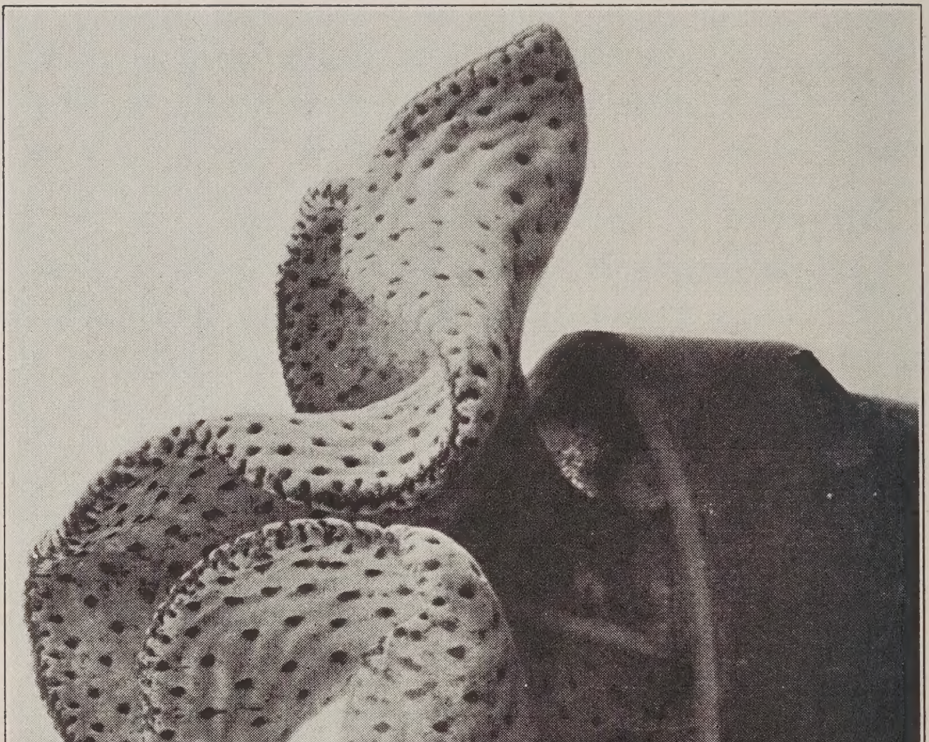
Some of the unarmed sorts are protected by their bitter or poisonous juices, because of which they are unmolested by animals, even when no other moisture is available.

68. What are the various types of spines?

As type, arrangement and number of spines are factors which enter into the identification of a specimen, it is well to recognize these easily. The spines springing from the little centers, felted or woolly or naked, known as areoles, have definite terms attached to their manner of arrangement—central and radial—the central generally differing in character from the radial. These terms are self explanatory. The shape of the spines is indicated by various words, such as subulate or awl-shaped; acicular or needle-shaped; setose or bristle-like; tortuous or twisting; and hooked. They are disposed in various ways, as erect, porrect (extending horizontally); curved or decurved (curving downward); appressed (following the surface of the Cactus closely); divergent; pectinate or comblike; sometimes marked with rings and called annular or annulate; (see illustration of Ferocactus viridescens, page 66). Some of the Opuntias have barbed spines; others have sheathed spines, the spine being encased in a thin papery sheath or envelope. A glochid is a minute, barbed, bristle-like spine, usually set in little bunches in the areoles of some Opuntias.

69. What is a Cristate?

A cristate is a crested form; the deviation from normal is well depicted in the illustration of an Opuntia basilaris crest. These abnormal forms are rare, and are accordingly prized by fanciers who count them as the gems of their collection.



CRISTATE OPUNTIA BASILARIS

70. Which Cacti should be selected for gardens and rock gardens?

See pages 112-117.

71. Which for window gardens and small single dish gardens?

See page 119.

72. How is the Cactus propagated?

Sometimes from seed. Many of them are of slow growth, especially in the early stages of development. Generally from cuttings or offshoots.

73. What treatment should be given cuttings?

See page 125.

74. How are Cacti propagated from offshoots?

Treat these as cuttings.

75. Do Cactus plants bear shipment well?

Yes. They may be some time in transit and yet arrive at destination perfectly sound. They should be carefully packed so that they may not be bruised in transit; a bruise may result in rot. The roots should be inspected and, if injured, cut back before planting.

76. What are the soil requirements of Cacti?

See page 127.

77. What is the most important consideration in the cultivation of Cacti?

Adequate drainage.

78. How can drainage be best secured?

See page 127.

79. When and how should they be watered?

See page 129.

80. What is the greatest foe to a Cactus plant in cultivation?

Rot. See page 127.

81. If a plant is affected by rot, can anything be done to save it?

See page 127.

82. When and how should plants be repotted?

See page 129.

83. How should plants just collected or received from collector be treated?

Be careful to trim all damaged roots, which may otherwise prove the cause of infection, and decay ensue. Treat as in repotting.

84. Should plants be placed in the sun?

They will do better if partially protected from the sun; or perhaps it would be better to say they should not be so placed that they are continuously subjected to the hot sun.

85. What is their period of growth, and how may they be known as growing?

After their blossoming season the new growth is unmistakable. It is evidenced by the pretty, fresh, soft look of the spines at the top of the plant.

86. In the cultivation of Cacti, are the spines not most annoying and troublesome?

Naturally, if one is careless, they might well be so. With reasonable care in handling the plants, however, they need not be.

87. How can this be obviated to a great extent?

They should be so arranged, if planted in the open, that with increasing growth they do not encroach one upon another to the extent of making it impossible to move among them without pricks from every angle. Of course, this implies a foreknowledge of what the growth of the species planted is likely to make; in fact the same knowledge that the effective planting of other trees and shrubs entails.

88. Are there special implements by means of which small Cacti can be handled satisfactorily?

See page 131.

89. What special pests should be watched for in the culture of Cacti?

See page 135.

90. What remedies are used?

See page 135.

91. Are new species ever discovered now?

Some new species were found quite recently for the first time; one of which, Mammillaria hahniana, is illustrated on page 105. It is claimed that one was rediscovered by a San Diego collector, the Utahia sileri. This is also illustrated (see page 74).

92. Are efforts made by culturists to improve Cacti, as by hybridizing?

There are many hybrids which have long been recognized by florists of such Cacti as the Epiphyllum and Phylocactus and others of the earlier species in cultivation. The United States Bureau of Agriculture has conducted many experiments leading to the cultivation of the Opuntia as a forage. Burbank made many experiments with these plants, not only for the development of a plant for use as a forage (Burbank's Spineless Cactus) but also in the improvement of the Opuntia fruits, resulting in the development of fruits of delicious flavor and very much larger in size. The fruits of the various Cerei, Echinocerei, and Mammillarias are also receiving the attention of both public and private experimentation, with a view to the production of a marketable and profitable fruit.

93. What benefits are to be derived from grafting?

See page 133.

94. What is the method used in grafting?

See page 133.

95. What is most often used as grafting stock?

Some varieties of cylindrical Cerei are often used; also Pereskias. Again, some varieties of Opuntia. On page 132 is shown an illustration of a grafted plant, the Rat-tail Cactus (Aporocactus flagelliformis) as the scion grafted upon a stock of Nyctocereus serpentinus.

96. Who have been some of the American botanists and collectors who have made Cactus history?

Engelmann, Bigelow, Coulter, Fendler, Palmer, Orcutt, Brandegee, Britton and Rose, Standley and others.

97. Are there special journals devoted to the study and culture of Cacti?

Journal of the Cactus and Succulent Society of America, Los Angeles, California. The Desert Magazine, Pasadena, California.

98. What books of interest to the general reader, on the subject of Cacti, are to be had?

An incomplete list is here given. Only books in the English language are listed. There are a number of interesting and finely illustrated books in German. Also there are (not here listed) many papers of great interest, but inaccessible to the general reader, because out of print or buried in reports that can only be obtained with difficulty. Various books of more general interest have references to these desert dwellers, as *California Desert Trails* (Chase); *The Desert* (Van Dyke); several of Mrs. Austin's books, as *Land of Journeys' End* (*The Mystic Midregion* (Bundick); *New Trails in Mexico* (Lumholtz).

ENGELMANN'S BOTANICAL WORKS, 1887.

This contains various papers on "Cacteae," and a volume of plates, illustrating the "Cactaceae of the Mexican Boundary" being here reprinted from the government report of that survey; also those descriptive of the Cacti collected on the route of the 35th parallel, known as Whipple's Expedition. Reprinted from the Government report. This is out of print, but it or the original government reports may probably be found at public libraries; its beautiful steel engravings are well worth trouble of looking it up.

BRITTON AND ROSE "CACTACEAE," 1900–1923. *Four volumes.*

These were printed under the auspices of the Carnegie Institution. This is the most complete and really the only work in English that is at all comprehensive. The work is fully illustrated. The first two volumes, at least, are out of print. Vol. I covers the Pereskieae and the Opuntieae; Vol. II includes the first two tribes of the Cereeae; namely the Cereanae and Hylocereanae. The other two volumes may still be obtained, it is believed. The "Cactaceae" is available in most public libraries.

CACTUS CULTURE FOR AMATEURS, William Watson (1887), Curator of Royal Botanic Gardens, Kew, England.

This has been reprinted. It contains much of interest but in nomenclature it has not been kept up to date. Its cultural notes are more applicable to English conditions than to those found in this country.

GOVERNMENT DOCUMENTS.

There have been papers published in the U. S. Nat. Herbarium, Bureau of Plant Industry, etc., most of which are out of print, but many of which can be had in public libraries. There are available:

"Cacti" by David Griffiths, U. S. Dept. of Agriculture Circular No. 66, June, 1929.

"The Tuna as a Food for Man," Griffiths and Hare, Bureau of Plant Industry, Bull. No. 116, 1907.

"Prickly Pear as Stock Feed," David Griffiths, 1928, Farmers Bull. No. 1072.

THE CARNEGIE INSTITUTION has issued several publications in addition to the Britton and Rose monograph, as:

"The Water Balance of Succulent Plants," MacDougal and Spalding, No. 141.

"The Fruit of Opuntia fulgida," Duncan S. Johnson, No. 269.

SOME STATE BULLETINS are also available:

"Cacti in New Mexico," E. O. Wooton, Bull. No. 78, 1911, New Mexico College of Agriculture and Mechanic Arts.

"An Account of the Cacti Native of Texas," Ellen D. Schultz and Robert Runyon, Proceedings of the Texas Academy of Science, Vol. XIV, p. 181.

"Color Schemes of Cacti," John M. Breazeale, June, 1930, University of Arizona, Tucson, Arizona.

"Cacti and other Succulents." A list of plants cultivated in the Santa Barbara region. Santa Barbara, 1930.

99. Are Cactus plants of long life?

Many Cacti are of slow growth; for instance, the Giant Cactus of Arizona, the Sahuaro. Dr. Forrest Shreeve states that growth is so slow that, at the end of the second year, they have a height of only a quarter of an inch; in these giants it has been estimated that the age is from 150 to 200 years. Many others of the large Cacti are estimated to be of great age. It is unfortunate that under conditions of cultivation, many die prematurely. On the other hand, under intelligent care, they live for years and give pleasure to many who otherwise would never have opportunity to see and know them.

100. What should be our attitude on the subject of conservation?

The author holds very strong views on the subject, somewhat at variance with those expressed by some of our rather radical writers. Conservation should undoubtedly be practised, but how?

Living in Southern California for many years, and seeing native plants all but exterminated by the encroachment of orchards, grazing and new real estate tracts, there has come to the author as a settled belief that the real conservation can be best accomplished by the adoption of two, perhaps three, methods in combination. First, the setting aside of tracts where the native vegetation shall remain undisturbed; second, the encouragement of the cultivation of native plants (the first injury done, as a usual procedure, is to clear a lot or tract of land of all its appropriate native growth and plant in its stead that which is usually exotic, inappropriate, and incongruous with its surroundings); and, third, a matter that would require money, labor and love of the plants and their care, the establishment of botanic gardens in connection with parks, schools, or whatever best may locally be secured, not for the purpose of collecting the rare and exotic, but of preserving and studying native growth.

101. What has seemingly been the effect of the measures so far in operation for the conservation of plants?

The scrupulous person carefully obeys the laws; the unscrupulous person evades it, and devastates the region in order to secure the plants that his more conscientious neighbor must buy. In consequence, there is more destruction, and the lover of the plants who wishes to preserve them in cultivation, sees prices doubled and trebled to him through the ravages of the unscrupulous bootlegger in plants.

CHAPTER VII

List of Cacti Native to the United States
And Their Distribution in the United States

(*Compiled from Britton and Rose "CACTACEAE"*)

NOTE.—As some of our readers may not be familiar with the rule governing the citation of authority, it may be said that the authority for the name of the plant is given immediately following its name. If, however, the name is later changed, the citation *must* give the later authority, and *may* give the first in parenthesis, followed by the *latest* without such parenthesis. Any number of synonyms may intervene without mention in citation.

For authority as to this rule, see Bailey's *Standard Cyclopedia of Horticulture.*

Britton and Rose are understood to be the later authority in any instance not noted in this list.

Acanthocereus pentagonus (Linnaeus)—Southern Texas, Florida.
Ancistrocactus brevihamatus (Engelmann)—Texas.
  scheeri (Salm-Dyck)—Texas.
Ariocarpus fissuratus (Engelmann), Schumann—Texas.
Bergerocactus emoryi (Engelmann)—Southern California.
Carnegiea gigantea (Engelmann)—California, Arizona.
Cephalocereus deeringii, Small—Florida.
  keyensis, Britton and Rose—Florida.
Coryphantha aggregata (Engelmann)—New Mexico, Arizona.
  arizonica (Engelmann)—Arizona.
  chlorantha (Engelmann)—Southern Utah, Western Arizona, Nevada, Southern California.
  deserti (Engelmann)—Southern California, Southern Nevada
  echinus (Engelmann)—Western Texas.

Coryphantha—*Continued.*
- macromeris (Engelmann), Lemaire—New Mexico, Texas.
- mühlenpfordtii (Poselger)—Texas, New Mexico.
- neo-mexicana (Engelmann)—Texas, New Mexico.
- nickelsae (K. Brandegee)—Texas.
- pectinata (Engelmann)—Southern Texas.
- recurvata (Engelmann)—Arizona.
- robustispina (Schott)—Arizona, New Mexico.
- runyonii, Britton and Rose—Texas.
- sulcata (Engelmann)—Southern Texas.
- vivipara (Nuttall)—Kansas South to Texas, Colorado.

Cylindropuntia (See Opuntia).

Dolichothele sphaerica (Dietrich)—Texas.

Echinocactus horizonthalonius, Lemaire—Texas, New Mexico, Arizona.
- polycephalus, Engelmann and Bigelow—Nevada, Utah, Arizona, So. California.

Echinocereus baileyi, Rose—Oklahoma.
- blanckii (Poselger), Palmer—Texas.
- chloranthus (Engelmann) Rümpler—Texas, New Mexico.
- coccineus, Engelmann—New Mexico, Arizona, Utah, Colorado.
- conoideus (Engelmann and Bigelow), Rümpler—New Mexico, Texas.
- ctenoides (Engelmann), Rümpler—Texas.
- dasyacanthus, Engelmann—Texas, New Mexico.
- dubius (Engelmann), Rümpler—Texas.
- enneacanthus, Engelmann—New Mexico, Texas.
- engelmannii (Parry), Rümpler—California, Utah, Arizona.
- fendleri (Engelmann), Rümpler—Texas to Utah, Arizona.
- fitchii, Britton and Rose—Texas.
- lloydii, Britton and Rose—Texas.
- mojavensis (Engelmann and Bigelow), Rümpler—California, Utah, Nevada, Arizona.
- neo-mexicanus, Standley—New Mexico.
- octacanthus (Mühlenpfordt)—Texas, Utah, New Mexico.
- papillosus, Linke—Texas.
- pectinatus (Scheidweiler), Engelmann—Mexico into Southern Texas.

Echinocereus—*Continued*
  pentalophus (De Candolle), Rümpler—Texas.
  polyacanthus, Engelmann—New Mexico, Arizona.
  reichenbachii (Terscheck)—Texas.
  rigidissimus (Engelmann), Rose—Arizona.
  roetteri (Engelmann), Rümpler—Texas, New Mexico.
  rosei, Wooton and Standley—New Mexico, Texas.
  standleyi, Britton and Rose—New Mexico.
  stramineus (Engelmann), Rümpler—New Mexico, Texas.
  triglochidiatus, Engelmann—Texas, New Mexico, Colorado.
  viridiflorus, Engelmann—Wyoming, New Mexico, Kansas, Texas, South Dakota.

Echinomastus dasyacanthus (Engelmann)—Texas.
  erectocentrus (Coulter)—Arizona.
  intertextus (Engelmann)—Texas, Arizona.

Epithelantha micromeris (Engelmann), Weber—Texas.

Escobaria bella, Britton and Rose—Texas.
  dasyacantha (Engelmann)—Texas, New Mexico.
  runyonii, Britton and Rose—Texas.
  sneedii, Britton and Rose—Texas.
  tuberculosa (Engelmann)—Texas, New Mexico.

Ferocactus acanthodes (Lemaire)—California, Nevada.
  covillei, Britton and Rose—Southern Arizona.
  hamatacanthus (Mühlenpfordt)—Texas, New Mexico.
  johnsonii (Parry)—Arizona, California, Utah, Nevada.
  lecontei (Engelmann)—California, Utah, Arizona.
  rostii, Britton and Rose—near boundary line of Southern California.
  uncinatus (Galeotti)—Texas.
  viridescens (Torrey and Gray)—California, San Diego County only.
  wislizeni (Engelmann)—Texas.

Hamatocactus setispina (Engelmann)—Texas, New Mexico, Arizona.

Harrisia aboriginum, Small—West Coast of Florida.
  fragrans, Small—Florida.
  simpsonii, Small—Florida Keys.

Homalocephala texensis (Hopffer)—Texas, New Mexico.

Lemaireocereus thurberi (Engelmann), Britton and Rose—Arizona.

Lophophora williamsii, (Lemaire), Coulter—Texas.

Lophocereus schottii, (Engelmann), Britton and Rose—Arizona.

Neobesseya missouriensis (Sweet)—North Dakota to Montana, Colorado to Kansas, Oklahoma, Texas.
  notesteinii (Britton)—Montana.
  similis (Engelmann)—Texas.
  wissmannii (Hildmann)—Texas.

Neolloydia texensis, Britton and Rose—Texas.

Neomammillaria applanata (Engelmann)—Texas.
  denudata (Engelmann)—Texas.
  dioica (K. Brandegee)—Southern California.
  hemisphaerica (Engelmann)—Texas.
  heyderi (Mühlenpfordt)—Texas.
  fasciculata (Engelmann)—Arizona.
  lasiacantha (Engelmann)—Texas.
  macdougalii (Rose)—Arizona.
  meiacantha (Engelmann)—New Mexico, Texas.
  microcarpa (Engelmann)—Texas, Arizona.
  milleri, Britton and Rose—Arizona.
  multiceps (Salm-Dyck)—Texas.
  oliviae (Orcutt)—Arizona.
  pottsii (Scheer)—Texas.
  viridiflora, Britton and Rose—Arizona, New Mexico.
  wilcoxii (Toumey)—Arizona.
  wrightii (Engelmann)—New Mexico.

Opuntia

Cylindropuntia arbuscula, Engelmann—Arizona.
  acanthocarpa, Engelmann and Bigelow—Arizona, California, Utah, Nevada.
  bigelovii, Engelmann—Nevada, Arizona, California.
  clavata, Engelmann—New Mexico.
  davisii, Engelmann and Bigelow—Texas, New Mexico.
  echinocarpa, Engelmann and Bigelow—Nevada, Utah, Arizona, California.

Cylindropuntia—*Continued*

fulgida, Engelmann—Arizona.
grahamii, Engelmann—Texas, New Mexico.
imbricata (Haworth), De Candolle—Colorado to Texas.
kleiniae, De Candolle—Texas.
leptocaulis, De Candolle—Distribution wide in the Southwestern United States.
parishii, Orcutt—California, Nevada.
parryi, Engelmann—California.
prolifera, Engelmann—California.
pulchella, Engelmann—Nevada, Arizona.
ramosissima, Engelmann—Nevada, Arizona, California.
schottii, Engelmann—Texas.
serpentina, Engelmann—California.
spinosior (Engelmann), Toumey—Arizona, New Mexico.
stanlyi, Engelmann—New Mexico, Arizona.
tetracantha, Toumey—Arizona.
versicolor, Engelmann—Arizona.
viridiflora, Britton and Rose—Arizona.
vivipara, Rose—Arizona.
whipplei, Engelmann and Bigelow—New Mexico, Arizona, Colorado, California.

Opuntia

Platyopuntia aciculata, Griffiths—Texas.
allairei, Griffiths—Texas, Louisiana.
ammophila, Small—Florida.
anahuacensis, Griffiths—Texas.
angustata, Engelmann—Arizona.
arenaria, Engelmann—Texas, New Mexico.
atrispina, Griffiths—Texas.
austrina, Small—Florida.
ballii, Rose—Texas.
basilaris, Engelmann and Bigelow—Arizona, California, Nevada, Utah.
cañada, Griffiths—Arizona.
chlorotica, Engelmann and Bigelow—New Mexico to Nevada, California.
covillei, Britton and Rose—California.
delicata, Rose—Arizona.

Platyopuntia—*Continued*

dillenii, (Ker-Gawler) Haworth—Coasts of South Carolina and Florida.

discata, Griffiths—Arizona.

drummondii, Graham—Florida to North Carolina

engelmannii, Salm-Dyck—Arizona, New Mexico, Texas.

erinacea, Engelmann—California, Utah, Nevada, Arizona.

ficus-indica (Linnaeus), Miller—Native home not known; found in tropics or subtropics as native or escape.

fragilis (Nuttall), Haworth—Wisconsin to Central Kansas and Texas; west to Arizona, Oregon, Washington, British Columbia.

fuscoatra, Engelmann—Texas.

grandiflora, Engelmann—Texas.

hystricina, Engelmann and Bigelow—Arizona, New Mexico, Nevada.

juniperina, Britton and Rose—New Mexico.

keyensis, Britton—Hammocks, Florida Keys, Cape Sable.

laevis, Coulter—Arizona.

lindheimeri, Engelmann—Louisiana, Texas.

linguiformis, Griffiths—Texas (Lingua de vaca or cow's tongue).

littoralis (Engelmann), Cockerell—California.

macrarthra, Gibbs—South Carolina.

mackensenii, Rose—Texas.

macrocalyx, Griffiths—In cultivation at Riverside, California; not known elsewhere.

macrocentra, Engelmann—Texas to Arizona.

macrorhiza, Engelmann—Missouri, Kansas to Texas.

megacantha, Salm-Dyck—Mexico, but grown in California as the Mission cactus; one of the best edible varieties of fruit, the tuna.

mojavensis, Engelmann—California.

nemoralis, Griffiths—Texas.

occidentalis, Engelmann and Bigelow—California.

opuntia (Linnaeus), Karsten—Massachusetts to Virginia, Georgia, Alabama; North into Canada and in isolated groups Illinois, Missouri, Tennessee.

Platyopuntia—*Continued*

phaeacantha, Engelmann—Texas to Arizona.
plumbea, Rose—Arizona.
pollardii, Britton and Rose—Mississippi, North Carolina to Florida, Alabama.
polyacantha, Haworth—North Dakota to Nebraska, Texas, Arizona to Utah, Washington, Alberta.
pottsii, Salm-Dyck—Texas, New Mexico.
procumbens, Engelmann—Arizona.
rhodantha, Schumann—Nebraska, Colorado, Utah, California.
rufida, Engelmann—Texas.
santa rita, (Griffiths and Hare), Rose—Arizona.
sphaerocarpa, Engelmann and Bigelow—New Mexico.
stenochila, Engelmann—New Mexico, Arizona.
stricta, Haworth—Florida to Southern Texas.
strigil, Engelmann—Texas.
tardospina, Griffiths—Texas.
tenuispina, Engelmann—Texas, New Mexico, Arizona.
tortispina, Engelmann—Wisconsin to South Dakota, Texas, Kansas, Colorado, New Mexico.
tracyi, Britton—Mississippi.
treleasei, Coulter—Southern California.
trichophora (Engelmann), Britton and Rose—New Mexico, Texas, Oklahoma.
vaseyi (Coulter), Britton and Rose—Southern California.
zebrina, Britton—Florida and Keys.

Pediocactus simpsonii (Engelmann), Britton and Rose—Kansas to New Mexico, North to Nevada, Washington, Idaho.

Peniocereus greggii (Engelmann), Britton and Rose—Texas, New Mexico, Arizona.

Phellosperma tetrancistra (Engelmann)—Arizona, California, Utah, Nevada.

Rhipsalis cassutha, Gaertner—Florida.

Sclerocactus polyancistrus (Engelmann and Bigelow)—California, Nevada, Arizona.
whipplei (Engelmann and Bigelow)—Arizona, Utah, Colorado.

Selenicereus spinulosus (De Candolle), Britton and Rose—Texas.

Thelocactus bicolor (Galeotti), Britton and Rose—Southern Texas.

Toumeya papyracantha (Engelmann)—New Mexico.

Utahia sileri (Engelmann)—Utah.

Wilcoxia poselgeri (Lemaire)—Texas.

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